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ABSTRACT

This project had as its objectives (1) the development of programs which would lead to the improvement of teaching science and mathematics K-8 in the state of Kansas, and (2) to test a dissemination model. One-hundred and ten principals and teachers attended seminars, lectures, and demonstrations and were involved in teaching elementary school science at five different locations in Kansas during the period August 5-23, 1968. Instructional materials from the following science curriculum projects were used in this project: Introductory Physical Science, Earth Science Curriculum Project, AAAS Science - A Process Approach, Science Curriculum Improvement Study, and Elementary Science Study. Descriptive reports from participants and project leaders indicate that the project was successful. Further, definable outcomes of this project are: (1) Kansas Department of Education has established a closer working relationship with persons responsible for pre-service training of elementary teachers in Kansas Colleges; (2) Kansas school systems are more aware of and involved in elementary science curriculum activity; (3) twenty exemplary elementary school science programs have been extablished; (4) undergraduate pre-service programs are being revised. [Not available in hardcopy due to marginal legibility of original document.] (BR)

NSF GW·3405
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DIRECTORS FINAL REPORT
(NSF GW-3405)
ELEMENTARY SCIENCE AND MATHEMATICS RESOURCE TEACHER DEVELOPMENT PROJECT

ED034690

This project had as its objective the development of programs which would lead to the improvement of teaching science and mathematics K-8 in the State of Kansas and to test a dissemination model.

Five short term informational conferences for principals, teachers and curriculum consultants were held August 18-23, in 1968. The conferences dealt with the following specific science curriculum projects at the locations indicated. The number in parenthesis indicates the number of persons in attendance.

Manhattan, Kansas (20)

Introductory Physical Science
Professor Eugene Crawford, Physical Science Department, K.S.T.C.
Mrs. Sharyon Neirman, Junior High School Teacher, Emporia, Kansas

Arkansas City, Kansas (22)

Introductory Physical Science
Dr. Allen Steinback, Physics Department, St. Johns College, Winfield, Kansas
Loren Lutes, Junior High School Teacher, Campus High School, Wichita, Kansas

Ottawa, Kansas (18)

Earth Science Curriculum Project
Time, Space and Matter
Professor Paul Johnston, Department of Earth Science, K.S.T.C.
Mr. Jimmy Buller, ESCP Teacher, Osage City, Kansas

*Great Bend, Kansas (24)

AAAS Science A-Process Approach
Science Curriculum Improvement Study
Elementary School Science Project
Dr. Glenn H. Crumb, Project Director
Mrs. Ramona Anshutz, Elementary Teacher, Harveyville, Kansas
Mr. Herbert Simmons, Flint Hills Science Project, Emporia, Kansas
**Mr. Jan Holman, State Department of Education for Kansas

SE 007 713

*Wellington, Kansas (26)

AAAS Science A-Process Approach
Science Curriculum Improvement Study
Elementary School Science Project
Dr. Glenn H. Crumb, Project Director
Mrs. Ramona Anshutz, Elementary Teacher, Harveyville, Kansas
Mr. Louis Butler, Elementary Teacher, Eskridge, Kansas
**Mr. Jan Holman, State Department of Education for Kansas.

The persons listed after each site were those responsible for the program presentation at the site listed. The reader will note the use of school-college personnel teams in each case. This was intended to accomplish two things: (a) establish a basis for fielding questions answerable by a program authority (college person) and by a person who had taught the program at least one year at the appropriate grade level (school teacher).

Travel, subsistance and a small fee for services were provided to each member used to staff the one-week informational conferences. No funds were used to provide facilities for the meetings although some equipment and replacement materials were provided by the grant. The participants received no stipend or college credit. Letters of attendance were provided teachers who attended in order that they could obtain school board credit for salary considerations.

Although the attendance at these one week informational sessions was limited, the number of different school districts (76) represented was felt to be significant.

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*At each of the above sites only two staff members were on hand on any given day.

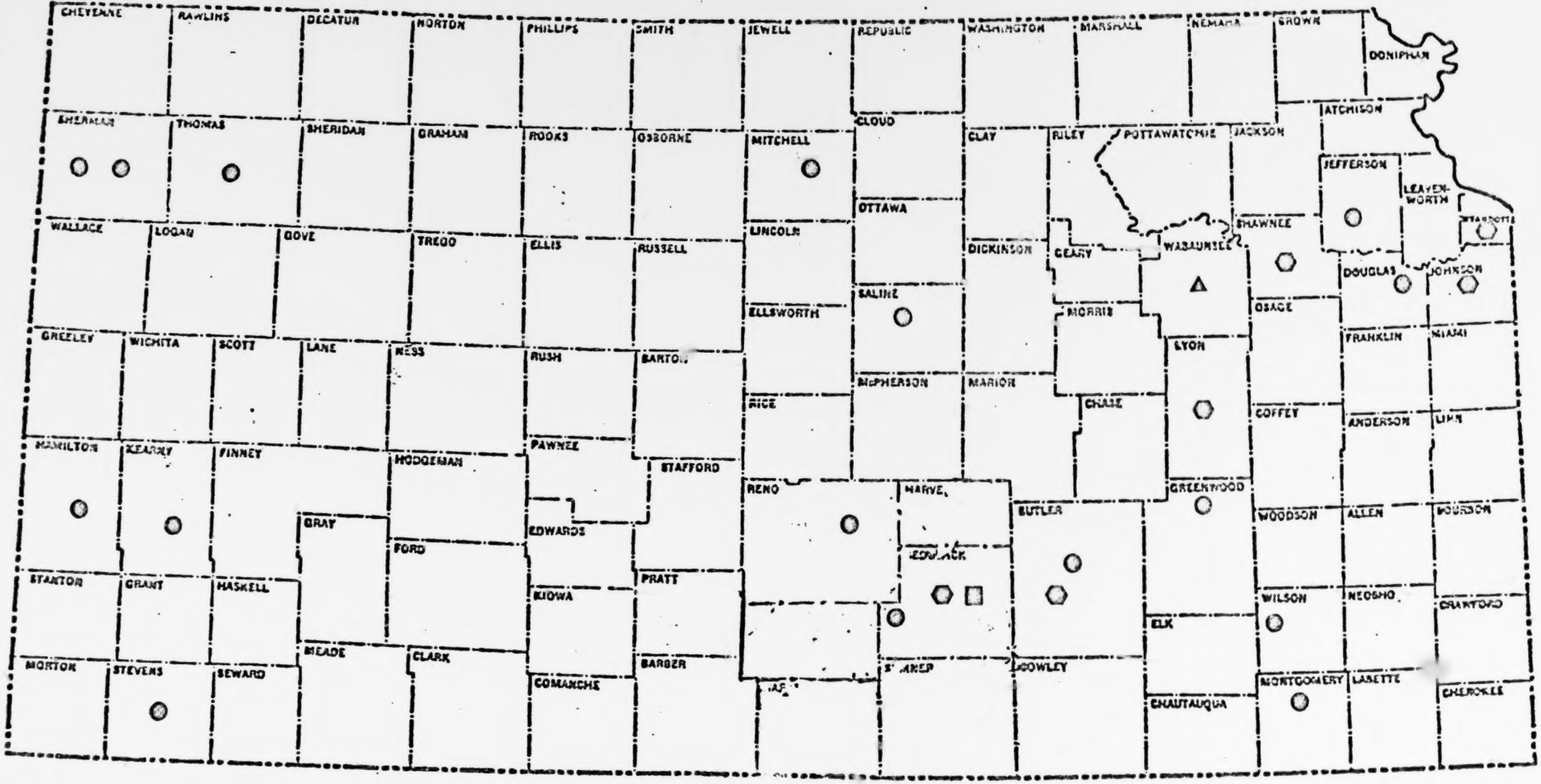
**Mr. Holman's time and travel was provided by the State of Kansas as a local contribution.

In addition to providing information about programs an attempt was also made to provide personnel to assist in implementing new science curricula materials. A group of 35 participants were selected from various geographic areas of Kansas somewhat based upon population distribution. (See attached map and participant list).

During the period of August 5-23, 1968 the participants attended seminars, lectures, demonstrations and were involved in teaching elementary school children. The subject material centered upon correlating mathematics with science teaching using the Science Curriculum Improvement Study materials and a variety of mathematics materials but particularly those of the Minnemast Project and the Nuffield Project.

Dr. Forrest Coltharp, Kansas State College, Pittsburg, provided most of the mathematics input. Dr. Glenn H. Crumb, Kansas State Teachers College, Emporia and Mrs. Ramona Anshutz, Elementary School Science Specialist, provided the SCIS materials instruction and Mrs. Twyla Sherman, Wichita State University, served to evaluate and assist with the mathematics and science program integration. It was initially planned that the program would also include the resource persons at Kansas University and Fort Hays State College as well as the Kansas State Department of Education (Science and Mathematics consultants). However, Dr. William LaShier from Kansas University joined the faculty at K.S.T.C. in the Summer of 1968; the death of a faculty member at Fort Hays State College caused the elimination of Dr. Raymond Kurtz from the program; and the serious illness of Mrs. Lucile Asher, Mathematics consultant for Kansas hampered her activities. Otherwise the Center Program did utilize the variety of personnel as initially planned. In order to

STATE OF KANSAS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CRAWFORD
ELK
MEADE
CLARK
SUMNER
COWLEY
MORTON
STEVENS
SEWARD
COMANCHE
BARBER
HARPER
CHAUTAUQUA
MONTGOMERY
LABETTE
CHEROKEE

● 1 Teacher
⬡ 2 Teachers
▲ 3 Teachers
■ 4 Teachers

GEOGRAPHIC DISTRIBUTION OF KEMS PARTICIPANTS

KANSAS ELEMENTARY MATH-SCIENCE (KEMS)
PROJECT PARTICIPANTS

Mrs. Ruth Bower
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Lenexa, Kansas 66215

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Wichita, Kansas 67203

Mrs. Dorothy Brakebill
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Wichita, Kansas 67203

Mrs. Frances Bruce
Route 2, Emporia, Kansas 66801

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Carla Cormode
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Topeka, Kansas 66614

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Mrs. Marjorie Anne Frankenbery
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Mrs. Carol Garcia
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Donald George
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Eskridge, Kansas 66423

Miss Lorina Knoll, 912 Hancock
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Dave Knorr, 7305 Robinson
Overland Park, Kansas 66204

Galen Long, 810 E. Court
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Mrs. Karen Ray Lowery
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Mrs. Harriett Martin, 7523 Pawnee
Prairie Village, Kansas 66208

Mrs. Christine Minnick
1841 N. 37th, Kansas City, Kansas

Mrs. Vera Molloy
1239 N. Derby, Derby, Kansas 67037

Mrs. Charlene Myers, 308 Broadway
Goodland, Kansas 67735

Mrs. Eleanor Nelson, 205 Broadway
Augusta, Kansas 67010

Tony O'Brate, Box 246
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Mrs. Vida O'Donnell, Route 2
Augusta, Kansas 67010

Mrs. Martha Piper, 5919 W. 94th St.
Overland Park, Kansas 66207

Mrs. Arvilla Riegal
Box 464, Lakin, Kansas 67860

Clara Stark, 1312 N. 8th
Independence, Kansas 67301

Maxine Daily
Exkridge, Kansas 66423

Miss Judy Van Blarcum
2819 East Harry
Wichita, Kansas 67211

Mrs. Margaret Waugh, 703 College
Goodland, Kansas 67735

Miss Martha Sue Wells
3750 Park South #16
Topeka, Kansas 66609

Mrs. Edythe Opal Winsor
1014 S. 4th, Madison, Kansas 66860

fulfill the program committment provided for in the proposal a greater proportion of time was provided by local consultants as well as Dr. Coltharp in mathematics and Dr. Crumb in science. The services of Mr. Jan Holman, Kansas Science Consultant and Mrs. Lucile Asher were provided at no cost to the project, indicating a truly cooperative venture from the Kansas Department of Education point of view.

Gradewise implementation by building or district was accomplished in 23 of the 35 school buildings represented (Note that more than one person was selected from some large districts). In addition, one person is currently involved in implementing new science curricula in 52 school buildings in a rural area in south-central Kansas.

The teachers were selected through a referral process as indicated on the Information Sheet found in Appendix A. Adequate funds were provided for the 35 persons selected to attend the 3 week summer workshop and the in-service program during the ensuing academic year. Since one of the major goals was to develop persons who could conduct in-service sessions some attention was given to problems and methods of such programs. The following items were collated from a listing of "Three Things That Should Be Included In a Workshop" which each participant provided the Director in the Spring, 1969.

Included in Appendix B is a written report by a majority of the participants. These reports were submitted prior to one of our Spring, 1969 sessions then discussed in small group program evaluation sessions.

Although some of the reports clearly indicate a close identity with the SCIS program some show a good deal of innovation in teaching science and mathematics in a unified manner.

THREE THINGS THAT SHOULD BE INCLUDED IN A WORKSHOP:

1. Letting each individual participate in the activities to become aware of how it feels to be working under a new type of instruction.

2. Letting everyone try their own ideas of integrating math and science by presenting them to small groups.

3. Having leaders of high quality, having interest in each individual besides the program as a whole.

4. It would help to have a chance to know each other sooner. Not necessarily through organized sessions but through a social gathering such as the workshop.

5. Working in small groups when the workshop contains many people.

6. A casual atmosphere.

7. A creative staff.

8. Actual involvement of participants in use of materials.

9. New materials available for teachers.

10. Should contain a unit theme of teaching. Math and science go hand in hand. Science enriches the subject of math.

11. Plenty of materials to work with for everyone. These materials should be easy to obtain at little or no expense.

12. Sense of seeing, working and discovering the new information, not just being an observer and learning a few facts. Even if the experiment doesn't come out a success, it is still a learning experience and the student is made to feel they are not a failure.

13. A capable program staff, well planned and materials available for total involvement.

14. Either one person to handle both math and science lectures, demonstrations and/or discussions or else close planning between science and math instructors so the leaders of each area will be able to refer to specifics already discussed in the opposite area he is in charge of.

15. Books, pamphlets and/or other materials available to participants to study and have for references.

16. Brain "storm" sessions of 8 or 10 where teachers could throw out the ideas they have though of trying in their own classrooms. This would give each individual teacher additional ideas and the suggestions could be discussed for advantages and disadvantages.

17. Leaders who have more to give than they have time to give and are concerned about what they are saying.

18. Enough sections so choices can be made.

19. Participants should have an assigned area where they may leave their materials and have 24 hour access to the materials.

20. Actual demonstrations using the new material with children.

21. Bulletins or flyers sent to their superintendents on what the participant is doing. Bring in the principal or superintendent from the home district to acquaint them with the new material.

22. Freedom and time to work with materials.

23. Feedback during entire school year and the one full week after the school year is ended.

24. A wide choice of activities that each participant feels he or she wants to do and with a sense of freedom to do each activity without feeling that it has to be done now or not at all. Possibly more things to do than time to do all of them but with material that each could possibly be done later.

25. Exposure to a variety of lessons from SCIS, AAAS, ESS and the new math projects such as Minnemast and Nuffield.

During the 1968-69 school year Mrs. Ramona Anshutz, Elementary School Science Specialist for the project, Mrs. Twyla Sherman, Dr. Glenn Crumb or Dr. Forrest Coltharp visited each participant's classroom and assisted that person in conducting an in-service workshop of at least three hours duration for the teachers of the district or building. Many of these sessions involved children in a demonstration classroom presentation. The children enjoyed the involvement as indicated by some of the letters selected from among those sent to Dr. Crumb from one school visited by Mrs. Anshutz. (See Appendix C).

In trying to evaluate the effect the project had upon the participant's classroom work each person was asked to submit a brief statement (one sentence) indicating "The Aspect of the Workshop that Helped Me Most in the Classroom". The listing below is a compilation of the statements with duplication and similarities eliminated.

THE ASPECT OF THE WORKSHOP THAT HELPED ME THE MOST IN THE CLASSROOM WAS:

1. Taking time to learn and to teach taking time to record and interpret data correctly; more experimentation and devices to discover answers; and a change in my philosophy of teaching methods.

2. Understanding the importance of stating objectives in relation to behaviors of the child after science instruction.

3. The discovering philosophy which I not only applied in math and science but all my teaching. I couldn't go back to my old ways if I tried.

4. "The discovery approach" to teaching. The idea that rote learning and lecturing is not necessarily the only way to teach. Let the child discover something (knowledge, how something works or grows or happens) for himself.

5. The overhaul of outmoded ways of teaching. To put the children in the spotlight.

6. Having an open mind to new and different ways of learning and being able to try a different method of teaching.

7. Learning to learn and teach by exploring.

8. Actually being involved in a discovery method of teaching. Those administering the workshop used the method and each participant also was given an opportunity to try the method. Just talking about the method would not have been sufficient.

9. The relaxed environment in an experimental learning situation.

10. The changing of my teaching methods. I am now willing to allow students to try out their own suggestions in an effort to discover facts for themselves instead of my telling them the facts.

11. The exposure to a variety of approaches to the new science curriculum. I was using SCIS Interaction materials and a "discovery" approach to teaching science before I came to this workshop. I had not been aware of what the ESS or AAAS programs had to offer. Also, I never sat down to think of ways of combining math and science. I had done this subconsciously but now have many more ideas of combining these two subjects. I did use the "discovery" approach in teaching more subject areas this year than last.

12. The sense of material and methods on the lower elementary level for presentation to my students. Encouragement that here is interesting material with an intriguing method of approach that I could feel at ease to use in my classroom.

13. The contagious enthusiasm in helping children prepare for their future. Much inspiration is always ready to be shared whenever a group of KEMS people get together. Their real love and concern for children is very evident at all times.

14. The courage to try out ideas of my own to a greater degree.

15. The "rubbing off" of the contagious enthusiasm for helping each child learn ways of extending his interests and knowledge so that he knows that learning is fun or can be fun.

16. The realization that the more and more our class really deals with a large problem or concept, and from this point it diverges not only into the math and science content areas, but into the language arts and social studies areas as well. By using this method of instruction, I found that the children were much more excited about learning, and that more content material has been covered than in previous years. On the last day of school it is a thrill to have a child state, "I'm sorry that school is out, we've had so much fun this year. I wish that I could be in your room again next year."

17. Being able to learn how to manipulate materials so as to make science and math meaningful to children.

18. That children must become involved in an exploratory program to learn and to be excited about school.

19. Being able to check out the materials from the science center which gave me more confidence and helped me to get other ideas as I used them in the classroom. Now I know one does not need all these expensive materials.

20. The educational philosophy used in the new science programs. I believe this philosophy of discovery, flexibility, adaptability, tolerance, involvement, which is based on the growth and development of children is sound and carries over into all phases of teaching. I sincerely believe children will learn more and better, and be better adjusted children because of being exposed to the philosophy behind the new science programs.

21. The sensitivity training with respect to my classroom.*

22. The change in teaching methodology. (from a textbook approach to the process approach)*

23. The interaction between the members of the class and the instructors. The demonstrations on how to use the materials were of great benefit to me later in the classroom.

24. An improved teaching technique and the support to use it in my classroom every day in every subject. I am not yet an expert at this, but I keep trying. I try to listen to children. I try to be enthused at every gain. I find it easy to sincerely accept each child's contribution to the class. Probably I still need to learn about the child who is slow to answer (but I try to wait for him). If math and science were to be abolished in September, I would still be a different teacher and person because of KEMS teaching technique.

In addition to producing a KEMS Newsletter (see Appendix D) monthly, Mrs. Anshutz, the Elementary School Science Specialist, completed the following list of activities during the 1968-69 school year. The letter attached to Dr. Hayes at Kansas State Teachers College indicates the response obtained.

SUMMARY OF ACTIVITIES OF
KEMS PROJECT ASSISTANT
DURING ACADEMIC YEAR 1968-69

	ITEMS	TOTAL
1.	Number of different classrooms of children worked with	137
2.	Demonstration with Children (individual children ranging from grades K-6)	2746
3.	Number of In-service teachers worked with during period	595
4.	Number of In-service workshops held (half-day workshops or one day workshops were not included)	29
5.	Number of adults (P.T.A. & Interested Parents)	332
6.	Call backs (Schools wishing to have additional visits after initial visit)	16
7.	Cities and Towns (Schools, Wichita 7, Dodge City 4, Great Bend 3, Topeka 2, Kansas City 3, Pittsburg 2)	43
8.	Number of Programs presented at Professional meetings	6
9.	College Faculty Members, (K.S.T.C.) using services for pre-service teacher ed.	12
10,	College Faculty Members off Campus using services for pre-service teacher ed.	14
11.	Number of Pre-service Teachers Contacted (Average 2.76 hours per person)	289
12.	Number of F.T.A. High School Students present at sessions	50
13.	Number of T.V. Teaching Tapes Made	15
14.	Number of Non-Kansas State Department People Worked with	3

March 14, 1969

Dr. Truman Hayes, Chairman
Division of Teacher Education
Kansas State Teachers College
Emporia, Kansas 66801

Dear Dr. Hayes:

Mrs. Ramona Anshutz, Elementary Science Education, was a guest on our campus this past week. The response from our staff, students and supervising teachers was extremely enthusiastic. Her work with KEMS project members and the children with whom she worked certainly exemplified a person of knowledge and enthusiasm.

We appreciate your sharing this person with us and will look forward to the next opportunity of having her on our campus.

Sincerely yours,

Robert Pate, Chairman
Elementary Education

cc - Dr. Glenn Crumb
Mrs. Twyla Sherman
es

During the summer, 1969, a series of five (5) workshops each of two (2) weeks duration were held in the State of Kansas by personnel associated with the project. These workshops were administered by Dr. Glenn Crumb through the School of Education, Kansas State Teachers College and the Continuing Education Department. Two semester hours of college credit were granted by the college. Fees were assessed for all participants and were used to defray travel expenses and provide college administrative costs as well as salaries for the instructors.

The sites, dates, the instructors, and the number of participants attending each workshop are listed below:

1. Emporia, Kansas, August 4 - 15, 1969
   Mrs. Ramona Anshutz and Dr. Glenn H. Crumb (24)

2. Emporia, Kansas, August 4 - 15, 1969
   Mrs. Florence Lemley and Dr. Glenn H. Crumb (19)

*3. Conway Springs, Kansas, August 11 - 22, 1969
   Dr. Bernadett Menhusen (22)

4. Great Bend, Kansas, June 23 - July 3, 1969
   Mrs. Ramona Anshutz and Dr. Bernadett Menhusen (42)

5. Colby, Kansas, July 7 - 18, 1969
   Dr. Bernadett Menhusen (13)

The above workshops were planned and conducted without charge to the project budget but were a direct result of the previous project activity.

During the spring semester, 1969, Dr. Forrest Coltharp, Mrs. Twyla Sherman, Mrs. Ramona Anshutz and Dr. Glenn H. Crumb were actively engaged in promoting curriculum change in the undergraduate preparation of elementary school teachers. Presentations were made and demonstration-

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* This workshop has resulted in adoption of Science-A Process Approach in grades K-3 of this rural unified district. In-service sessions will be held during the 1969-70 school year, supported by the school district.

workshops were conducted at the following sites:

1. Kansas State College, Pittsburg, with persons in attendance from the surrounding two-year and four-year colleges in Missouri, Oklahoma, Arkansas, and Kansas. A total of 10 different colleges were represented.
2. Dodge City Community College, with teachers from the public schools and pre-service teachers as well as college science and education personnel in attendance.
3. Kansas State Teachers College, Emporia. Those in attendance included representatives from the science departments, the graduate Dean, the Dean of the School of Education, the head of the department of curriculum and instruction and all teachers in the campus elementary laboratory school.

Presentations of the above type are currently planned for Kansas University, Lawrence and Johnson County Community College, Merriam (a Kansas City suburb). These presentations are not being supported by project funds but are a direct outgrowth of the activities of it.

Two definite curriculum changes have occurred at Kansas State Teachers College as a result of the project activity. During the Spring semester, 1969, the Director and the Elementary school specialists assisted and advised the School of Education in planning and conducting a new course in Science for the Elementary School taught on an experimental basis. In the fall, 1969, the course was further revised and became part of the college program of studies of pre-service elementary school teachers. Additional sections will be added and others revised until all persons who obtain a degree to teach in the elementary school from Kansas State Teachers College will have taken the course. The content of the course as presently designed involves: the process approach using stated behavioral objectives with preassessment and competency measures. Students do micro teaching with peers and children. They use materials (hardware and software) from ESS, SCIS, and AAAS. There is essentially no lecture but there is a lot of laboratory activity with emphasis upon developing process skills, teaching techniques and sensitivity to others in a teaching-learning atmosphere. How evaluation relates to learning is a thread throughout the course

The second change is a direct result of this project. The Dean of the School of Education has petitioned the Vice President for Academic Affairs and the President of the College to establish an Elementary School Science Education Center as part of the School of Education and Psychology. The petition provides for no additional space positions or funds hence it has an excellent chance of being approved. The functions of the Center, as outlined in the petition are:

1. The Center will be responsible for the effective coordination of all elementary science activities including supervision of instruction and the curriculum content of all elementary science education courses taught within the School of Education and Psychology (all elementary education majors are required to take at least one course in Science in the Elementary School).

2. The Center will be responsible, via the Head of the Department of Research and Laboratory Experiences, for the science program of the laboratory schools. Furthermore, the Center will be given the charge to make the science program of the laboratory schools a coordinated program for pre-school through grade 12 which would encourage experimentation.

3. The Center will be the focal point for in-service training programs for the public schools of Kansas. Kansas State Teachers College presently receives far more requests than it can fulfill to provide in-service programs for public school teachers in the new science curricula such as are being produced by AAAS and the National Science Foundation.

4. The Center will initiate projects to further information and resources relevant to science education. It will actively seek funding for such projects from all available sources.

5. The Center will represent the School of Education and Psychology in all cooperative science education efforts with the School of Liberal Arts and Sciences.

The following seem to be clearly definable outcomes of this project:

1. A close working relationship has been established between the Science Consultant and Mathematics Consultant of the Kansas Department of Education and those persons at Kansas colleges most closely identified with pre-service training of elementary school teachers.

2. Kansas school systems that formerly were only vaguely aware of elementary school science curriculum trends are now actively involved in adopting some new program. The number and the various stages of adoption is difficult to assess. Large school systems such as Kansas City, Wichita, Topeka and Shawnee Mission as well as a large number (in excess of 50) smaller rural schools are now using modern science curriculum materials and methods in one or more classrooms. The chief deterrent to further adoption is money and teacher training.

3. There has been a close knit communications network established in Kansas among those interested in improving elementary school science and mathematics in the State.

4. There are established at least twenty (20) exemplary elementary school science programs scattered throughout the State. In at least one-half of these the key teachers are closely integrating mathematics with science. These classrooms (schools) are active centers for promotion of curriculum change as cited by the building principal and superintendent.

5. Revision of undergraduate elementary school teacher preparation programs have been affected in Dodge City Junior College, Wichita State University, Kansas State Teachers College, and Kansas University, Lawrence. Progress is currently being made building a curriculum in another new Junior College in Johnson County, Kansas.

6. The establishment of a felt need to be met by Kansas State Teachers College. Specifically the development of a permanent Kansas Elementary Mathematics-Science Center on the Kansas State Teachers College campus.

APPENDIX A

INFORMATION SHEET

Title: Elementary Science-Mathematics Personnel Development Program

Institution: Kansas State Teachers College

Address: Emporia, Kansas Zip Code: 66801

Duration: Summer 3 weeks beginning August 5, 1968 and ending August 23, 1968. Academic year 36 weeks beginning September 21 and ending June 7, 1969. The latter will have 15 meetings to be held on September 21; October 23; November 9; December 9, 1968; January 11; February 1; March 1 - 22; April 12; May 10; June 2, 3, 4, 5, 6, 1969.

Selection of Personnel. Thirty-six (36) experienced elementary school teachers who have demonstrated the following attributes will be selected:

(1) enthusiasm for and effectiveness in the teaching of modern elementary school science and/or mathematics.

(2) subject matter knowledge in science and/or mathematics sufficient to teach the subjects in all grades K-6.

(3) understanding of the elementary school pupils and the goals of education at this level. Preference in 1968 given to K-4 teachers.

(4) leadership capabilities in terms of peer elementary school teachers.

Assistance in identifying the (36) persons is being sought from College and University faculty members, project directors who have worked with elementary school teachers, science and/or mathematics supervisors, and state science and mathematics curriculum consultants who have conducted workshops in the state.

Training of Personnel. During the Summer of 1968 the selected personnel will attend a three week session on the campus of Kansas State Teachers College, Emporia, Kansas from August 5 through 23. During this session the teachers will be systematically conducted through the mathematics and science content appropriate to grades K-3. With this content will be presented the modern approaches to teaching these materials to children at the specified grade levels. Science materials such as, Science-A Process Approach (AAAS), The Elementary Science Study (ESS), and Science Curriculum Improvement Study (SCIS) will be the vehicle for the science subject matter study. Mathematics including algebra, geometry, arithmetic, and logic as related to the modern elementary school mathematics curriculum in grades K-3 will be the substantive base for the training program. Ties between mathematics and science at these grades will be emphasized in the discussions and laboratory sessions.

During the academic year 1968-69 these same persons will attend ten (10) full-day work-sessions in order to increase their contact with the materials and subject matter. In exchange for teacher time, workshops in science and mathematics instruction will be conducted by each of the 36 persons in their home school during the Spring 1969. Full support in conducting these workshops will be provided by the project personnel.

Plans for Summer 1969. In June, 1969 teachers will attend an intesnsive five (5) day session in preparation for the workshops that are to be conducted that Summer. The purpose will be to smooth out the operational aspects of the program, review and strengthen areas of weakness in subject matter and philosophical presentation. It is planned to employ the 36 participants to conduct eight (8) simultaneous workshops with 100 teachers each in June and July (1969) and an additional eight (8) during July and August (1969). Salaries for these sessions will be negotiated with the participants selected. Funding is being sought to continue this program for four years.

Participant Support. During the three (3) week program in August, 1968 and the one week of June, 1969, each participant will receive a seventy-five dollar ($75) per week stipend plus fifteen dollars ($15) per dependent per week and travel expenses for one round trip, between the participants's home and Emporia, Kansas, at the rate of eight (8) cents per mile. No funds are provided for travel or support during the 1968-69 school year.

A maximum of six (6) semester hours of graduate level credit (tuition free) is available to each participant during the program from August 5, 1968 through June 6, 1969.

Direct all correspondence and applications to:

Dr. Glenn H. Crumb
Research and Grants Center
Kansas State Teachers College
Emporia, Kansas 66801
Tele: 316-343-1200 Ext. 351

Deadline: June 15, 1968

APPENDIX B

Integrated Science and Math in Grade I

Mrs. Edythe Opal Winsor

I was able to integrate quite a lot of math in our work with SCIS's Grandma's Button Box. In addition to grouping the buttons according to different properties, we counted them by 1's, 2's, 5's, and 10's, and a few of the faster students learned to count by 3's and 4's using the buttons and a number line.

Questions or problems--Using the large second hand on the clock, find out how long it takes to count your buttons by ones; by twos, fives, etc.

After counting the handful of buttons several ways and taking note that the same total was arrived at each time, two students at a time were sent to the chalkboard to write their totals, 8 to 10 inches apart. A circle was then drawn between the two numerals and the pair of children decided on and placed a comparison sign, (>, <, or =) in the circle and then read the number sentence to the class.

I used the Grab-Bag Game and the A-Blocks for recognition and identification of geometric shapes and also for our work with "sets."

We did the ESS unit "Growing Seeds" in the spring. Each child chose two different kinds of seeds to plant (or two different kinds of soil or growing conditions). The children measured the growth of each daily with a piece of colored construction paper 1 1/2 inches wide. These "growth" strips were then pasted on a large sheet of contrasting color to show the "steps" or stages of growth.

We divided the members of our class into "sets" according to the color of eyes and made a bar graph to show the number in each set. (sample enclosed)

We reviewed our ordinal number words (first, second, third, etc.) and our "property" words (color, size, shape, texture) by using the buttons. I placed word cards in the pocket chart such as "Make a row of buttons on your desk this way--first, blue; second, square; third, rough; fourth, small; fifth, pink;" etc.

I can now see possibilities for using the "Button Box" at the first of the year in working with sets. Let the students group the buttons into sets according to color. Develop the idea of number as a property of sets:

(1) Which one of your sets has more members? (Match one-to-one to find out.
(2) Have you found any two sets that can be matched exactly?

To learn the one-more pattern for numbers, ask one child to find the set with the fewest members and place it near the edge of a table.

(1) Does anyone have a set with just one more member? Place it next, etc.

For the "ordering" of sets, children could work in small groups with each group having six to nine small boxes or other containers. Give each group a handful of buttons and ask the children to place the buttons in the boxes in such a way that no two boxes have the same number of buttons in them. Have the children arrange the boxes so that the sets are in order. Begin with the set having fewest members (the empty set.)

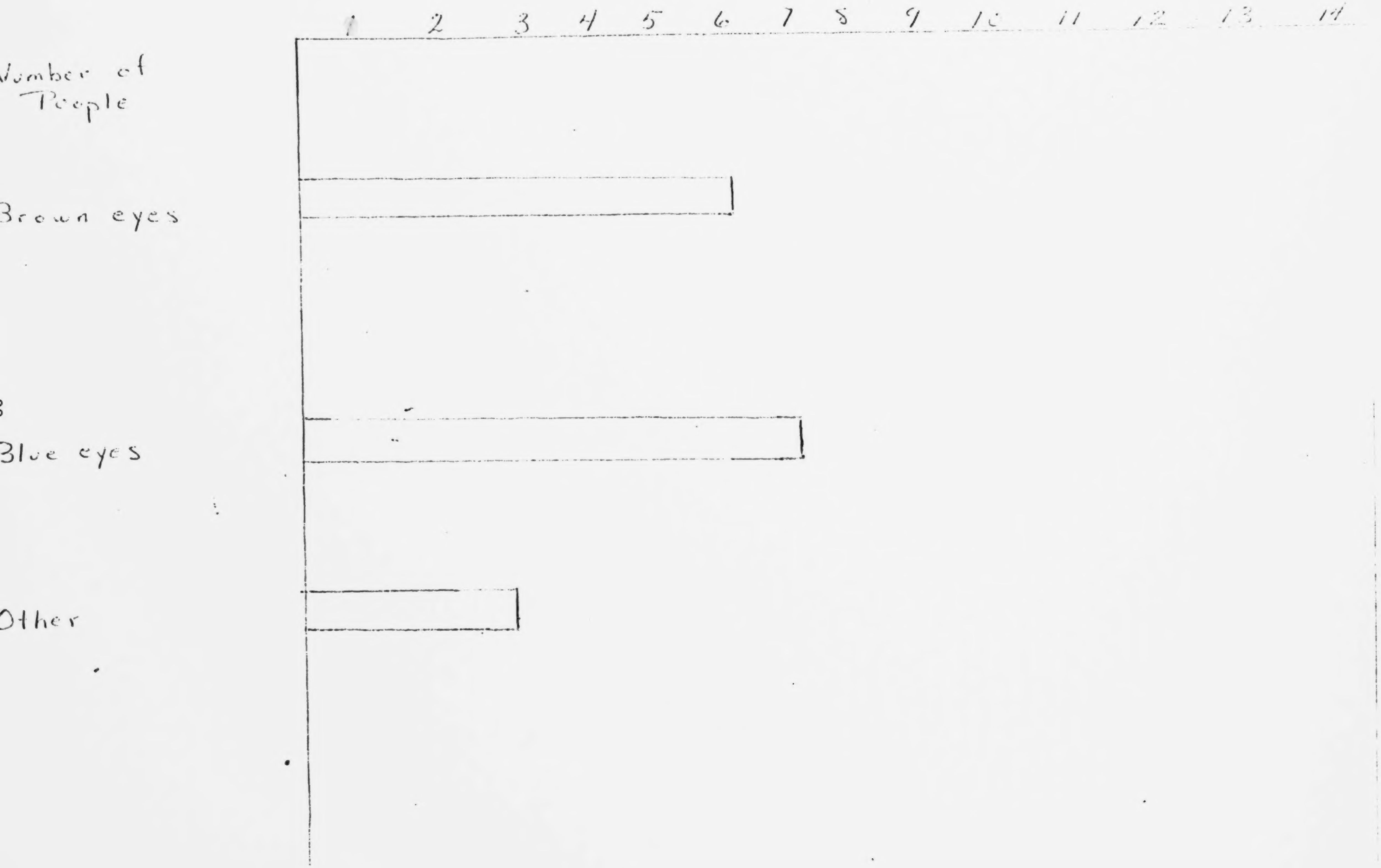
For beginning work on the joining of sets, give each child a collection of buttons in a box. Say:

(1) Hold a set of three buttons in one hand; hold a set of two buttons in the other hand; put a set of five buttons on your desk.
(2) Put four buttons in your right hand; put one button in your left hand; this is a set of how many buttons?
(3) Put a set of three buttons in your right hand; put a set of no buttons in your left hand; is this a set of three buttons?
(4) Put a set of three buttons in each hand; bring your hands together. This is a set of how many?
(5) Put a set of four buttons on the floor on your left side; put another set of four buttons on the floor on your right side; how many buttons did you put on the floor?

Tell the children to divide their buttons into two sets so all the buttons in each set are somehow alike. Place the correct plastic or cardboard comparison sign between the two sets. (The point is toward the smaller number.)

Cindy

A Graph of the Eyes in Our Class



Changes Jars

Miss Judy Van Blarcum

I had setting out on one of our tables a few jars that had in them various objects: seeds in water, a dog bone in water, tacks, paper clips, etc. Excitement built as to why the jars were there. When the excitement was at its highest point we discussed what was inside the jars. The children predicted the changes that would occur in each of the jars. I encouraged the children to bring objects, such as food, metal objects, etc., that they would like to watch to see what changes occur. Many of the children brought more than one object to fill empty jars on the shelf. Each jar was marked and predictions made. Then each child made a notebook to keep notes and observations on the changes which occurred. The children gained skills in observation and the reporting of data.

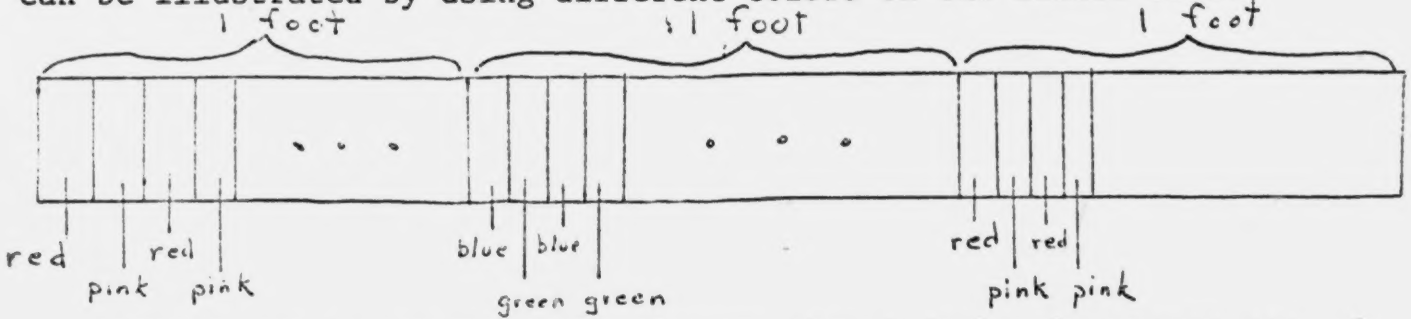
Plants

When we were growing our plants, we ordered the plants according to height. This was done at least once a week. The children could readily use words such as first, second, third. . .

Tape Measure

We ran into problems when we went to measure the length of an object and that object was longer than our foot ruler. We discussed ways we could measure this object anyway. Someone suggested we move the ruler. This was not too successful because everyone who measured this same object discovered it to be a different length. We thought and thought. Someone suggested a yardstick. We did not have one. Through more discussion, someone thought of their mother using a tape measure to measure big objects.

In a trial edition of AAAS, I read about these tape measures. Use a piece of masking tape 60 inches long. Stick onto this piece of tape (sticky side) 1 inch long strips of construction paper. If you want to show inches, you can alternate colors of paper. Also, feet can be illustrated by using different colors on the middle foot.



Strips may be cut slightly shorter than 1 inch, then tapes can be folded and put in pockets.

Activities to reinforce Interaction concepts can be found in Chemistry with Lemons.

Relativity activity

After the Relativity unit had been introduced to the children and a few of the games played as described in the front of the manual, my children were still having some difficulty pinpointing the position of an object. I had the children make signs to describe a position where an object might be. Some of the signs said: "on the table," "behind the piano," "in front of the door," "to the left of Lisa," "on the floor," "to the right of the closet," etc. We then taped these signs where they belonged. For example, "on the table" was taped on the table, "under the table" was taped under the table and placed so everyone could read it. Signs saying to the right of, to the left of, in front of, behind, were taped on objects which were to the right, left, in front or behind the object the sign made reference to. These signs then made describing the position of objects easier to the children.

Look at That. . .Oooo!

Carla Cormode

In the past nine months of living in the world of discovery and predicting, our most "Oooo's" and "ahhing" times were during the delightful days "living" with the organisms found in water.

Two one-gallon jars of pond water were brought into our room and poured into an aquarium for observation by the naked eye and through the spectroscope. After observing the Gammarus, aphid, Planaria, and daphnia we kept daily records of observation.

At the height of our excitement I took an overall view of our project and its growth was unbelieveable. The room looked like a small sample lab. We had pond water, ditch water, creek water, gutter water, puddle water, drinking water, wash basin water, tub water, curb water, flower water, and rain water. Observations of the organisms were recorded on all.

The daphina seemed to have been the organism that aroused the most interest. We observed and counted heart beats, counted legs, counted number of eggs in each, found the average number of eggs in the female, watched them hatch under the spectroscope and observed the effect of the intense heat upon the daphnia.

The children then decided to take some daphnia cultured in the pond water, and put in all the types of waters collected which had already been observed. This tested the adaptability to different environments.

They also decided to put algae in some water with the daphnia to observe the changes.

This, to me, seemed to be one of the more interesting activities this year which I feel the children gained much value in experimental discovery.

A New Approach to the Teaching of Science

Martha Sue Wells

"Science is not rules or magic, but observations and ability to estimate, predict and conclude from these observations."

The new approach to the teaching of Science is not actually "new." It is a method that good teachers have been using for years. It is "new" in respect to having an organized way of achieving entire individual involvement and concentration on the inquiry method. Teachers soon find teaching this way is more difficult to garnish with rules; and, therefore, it becomes abstract in nature.

As a result of the Kansas Elementary Math and Science Workshop (KEMS), I feel have been able to teach, not only in Science but in other areas, the way I have always felt we should teach. This is further illustrated in the next paragraph.

As teachers we are very concerned with right or wrong answers. Through teaching the inquiry method, you learn to accept all answers and questions until you come up with the most logical conclusion. The teacher's rule changes in this process, from that of a dictator to a spectator. She no longer answers, but if the question is not successfully concluded, questions more until a logical solution is found.

In order to seek reasonable conclusions, children must be taught to recognize the problem and as many aspects of it, as is possible. One of the first things to teach children is observation and names for these observations. For example, "What can you tell me about this chair?" It is brown, the legs are a line, part of it is flat, etc. These are all properties of an object and are necessary to know if we are going to study the object. Having an organized way to approach observations in this manner, I have learned to keep quiet and let the children do the talking. I have also learned to accept any answer, knowing that eventually the wrong answers will help lead to correct answers. This method of teaching has helped a great deal in Social Studies as well as Science. No teacher has the time and energy to develop her units of study as she would really like. This method lets the children lead you. You only ask questions to get them started and interested and keep them going.

It was mentioned to us in the KEMS Workshop teachers should not be given the new Science materials and be expected to teach in this fashion if she is not familiar with the philosophy. As a result of this philosophy I see new possibilities each day as I work with children in the program. This is the reason that the effectiveness of the program is difficult to put into words. The best I can say is that it is the line of questioning you are able to bring out in yourself and in your children that makes you think they are really learning to be observant enough to make decisions and reach reasonable conclusions. The other very important thing is having lessons where each child may have relevant materials in his hands. There is no need to emphasize the impact this would have on child involvement and interest. The new Science Programs have these materials available or ideas for making the materials available.

An Innovative Way of Teaching Magnetism and Electricity

Charlene Myers

Possibly the most exciting experimenting my fourth graders did was with individual boxes from Interaction containing the following items: small piece of wire, small plastic bottle, small bulb, pencil, paper clips, magnet, card, small candies, clay, flashlight battery. Several days were spent with the children trying as many different things as they wanted with the materials in their boxes.

Some of the children were most interested in working with the magnets. They made lists of all the materials the magnets would attract and the properties of the magnets. Then they discovered that the magnets would work through some materials and not through others. They made lists of those materials. They also found that the thickness of the materials seemed to make a difference so they tried experiments in this area. They wondered whether the size of the magnet made any difference so they brought magnets from home to try.

Some of the children discovered they could make electromagnets from the materials in their boxes. They conducted experiments with many different materials to see what could be picked up. They banded with others to have more materials to use and tried experimenting to see whether the number of batteries made any difference in the electromagnetic system. They tried putting together several pieces of wire and then tried using paper clips in place of the wire.

Other children, after finding they could produce an electric circuit, tried many different experiments. One was the putting together of various numbers of batteries. They concluded that the more batteries used the brighter the light that was produced. They tried making an electric circuit through materials such as clay. An experiment was conducted concerning the amount of heat produced. They also tried to see how many bulbs and batteries they could connect in one circuit.

These activities were initiated entirely by the students and groups were formed spontaneously by them as the need arose.

After the children had experimented for several days, use was made of a commercial electricity kit available in the school. The children spent much time making telegraph sending sets, etc.

One of the boys asked to have his father who teaches electricity come to class to explain some of the principles of electricity.

This particular phase of science is one the teacher knows very little about. However, the students devised their own experiments and came up with their own conclusions, maintaining a great deal of enthusiasm through the entire project and spending every spare minute involved in it.

Pauline Gifford

This spring I taught classes in kindergarten, second grade, and two other fourth grade rooms. In the first two the teachers observed and I had excellent response and participation by the children. In the fourth grade rooms the teachers were concerned about noise, etc. How could children be quiet and discover without sharing how a battery operated motor will drive a machine of their own manufacture, paper or not!

I was pleased with the results of my teaching which included much student involvement in the following areas:

1. Life cycles of Monarch Butterflies. We banded the adults as in the book Monarch X.
2. Life cycles of beans.
3. Life cycles of fruit flies and an understanding of overpopulation.
4. Discovering the reason for the period of a pendulum swing, how to vary the period and graphing the information.
5. Discovering the reason for the oscillation of a number of springs when weights were attached and graphing the information.
6. Studying and discovering many systems. Understanding what is meant by the statement, "All systems are go."
7. Discovering that the human body has many systems. Learning to define the use of some of these systems in particular, the skeletal. Discovering ways that some animal skeletons are alike or different from bones brought by the students.
8. Using the magnifiers and other tools to find and researching to name the parts of living flowers.
9. Outdoor observation of plants, comparison of the plants at various stages, and discussions about eradication of weeds.
10. Observation of a hen's egg in the shell, after it is broken and discussion of the part each area plays in development of a chick. Reading the thermometer of the incubator, turning the eggs, and seeing the actual hatching process were also learning situations in our study of incubation.

Patricia Clair

For easy storage of mystery powders or anything else you want to store, use small baby food jars. Three of these jars fit nicely in a one-pound cheese box. Label the outside of box and stack in cupboard.

Storage boxes and trays all in one. Use one inch deep hosiery boxes found at most department stores. Store your objects in the bottom, and use the lid as the tray. Even a small battery will fit. When not in use replace the lid, fasten with rubber band, and stack in cupboard.

Using the same idea take the smaller hosiery boxes. Glue felt, burlap, or flannel in the lid. Use the bottom to store a set of objects and several pieces of colored yarn. Each child has his own self-contained flannel board.

This is not a new idea, but children love a bulletin board that invites touch. So try thinking as you put up a board what kinds of material you could use to change the texture and watch those hands touch the Charmin.

Most cafes and some school cafeterias have milk dispensers which use five gallon or more boxes of milk. Inside the box is a plastic bag. Wash the bag. These bags are like big pillows when inflated and are made out of double strength plastic. The children can play with, examine, and experiment. Another use is to give each child a deflated bag before going on a field trip and if you become tired or want to sit and talk awhile, inflate the pillow, use a rubber band to keep the air from escaping and sit. When finished deflate and continue. The bag is about 18 inches square.

You have used the bag! The box is sturdy and a nice size for storage. Also by taking two boxes and cutting them half way down, slip one box inside the other and tape corners. You now have a very sturdy stool. Decorate it any way that you like.

Buttons! Buttons! Who Has the Button?

The buttons are really great. I have found this a wonderful way to work with larger than and lesser than. Each child is given an undetermined number of buttons. After several times with the buttons I may ask them to sort according to color. Then pick a particular value to talk about such as red. Then ask the youngster one at a time to record the numeral on the board that tells how many buttons they have, 15, 17, 18, etc. Who has the most? lesser? How many greater? lesser? Later on have them divide the buttons in sets of two, to discover odd and even numbers. As we were doing this one day I was quite thrilled with the thinking that was taking place. One youngster had discovered she had 13 buttons and when divided into sets of two she had one remaining button. When all of a sudden a boy at the front of the room said, "She has a half dozen 2's and 1 left over, or a dozen and 1 buttons!"

Melvin Deering

The one thing I did all year and for the first time in my short teaching experience was to try presenting something I had not read about or heard anyone else say they had tried with their students.

After I tried it I found that others had, of course, done the same thing but it was a unique experience for me. An innovation I tried on my own!

After teaching the "relativity" units to my older (4,5,6 grade) students I presented it to the third graders. They did so well, I thought "why not try it with the first and second graders?"

It was a slower process, naturally, and not as sophisticated as the older children, but many of the children were really able to put themselves in Mr. O's or someone else's place and describe the location or movement of an object from a position other than their own.

We related the things learned to the children's environment by going out on the playground and using the equipment as our classroom.

The children enjoyed this very much and even seemed thrilled that something happening in school was immediately applicable to what they did outside of school. They did not have to "grow up" before using what they were learning and experiencing.

Do They Really See?

Vida O'Donnell

Early this spring my fourth grade pupils at Garfield School in Augusta remarked that a green elm tree had small leaves when actually it was loaded with seeds. It was surely time to teach them how to take a closer look at trees. Being able to identify trees was a limited field for myself. Nevertheless, I decided to launch out so that I might make my pupils aware of the marvelous things that were escaping their attention each day.

The first step was a tree walk around the school yard. We gathered leaves from six trees. These went into a leaf press which had been constructed of alternate layers of cardboard and newspaper which could be strapped tightly together. I was hesitant about the identification of two trees, did not know one, and feinted positive identification on the others to encourage use of research leading to pupil identification. Every tree was positively identified by the student research. They were thrilled to find what they had seen and returned for a second look, and much closer this time.

Two film strips on tree and leaf identification and classification further demonstrated how to look at the characteristics of leaves and trees. After the class viewing and discussion these films were reviewed many times by the use of a small film viewer.

The high light in the tree observation study was a trip to the Bartlette Arboretum at Belle Plain, Kansas. Not only were they given a guided tour but were allowed to bring two leaf presses, and were given a cutting from approximately fourty different trees. These pressed beautifully in their home made presses and the pupils could scarcely wait four or five days to mount them and write stories about their favorite trees.

Another year I will not wait until spring but will start early in the year on leaf and tree identification. This way the many different trees could be taken up more slowly. It would, also, be a good way to get fall and spring specimen. I would, also, try to do a better job to emphasize the date and place of collection so the record keeping would be more complete and more useful. This way I could encourage children to revisit specific trees for the fall leaves, seeds, and spring leaves.

Other than leaf mounting and tree reports I think I will be able to work out other art projects, seed studies, and leaf characteristics and classifications. Along this line I have learned recently about lamenating and I want to do this if I possibly can. I do not think I will have access to a dry mount press but I certainly intend to experiment with an iron since lamenating makes the collections so much more permanent.

Not only am I excited about doing so much to increase my own enjoyment but to know that I influenced children to take a closer look at the friendly stately tree is sheer pleasure. Then I consider future years and how beautifully I may be able to lead them to add to their appreciation of their immediate surroundings and that this appreciation is part of them then I experience a warm exuberation.

Some Diferent Methods of Presenting the Same Materials

Tony O'Brate

Instead of purchasing the kits for material objects, I had each student bring 10 objects in a paper bag. Without showing or telling what they brought, the other students asked about the properties of the object the student had in his hand inside the bag. After all the possible properties had been discussed and written on the board, we tried to guess what the object was. Some of the unusual objects the students brought were copper tubing, an apple core, and a transistor battery.

Watch Us Live and Learn at School

Lorina Knoll

We did the S.C.I.S. Unit of Relativity at Lowell Elementary School, Salina, Kansas, in the fourth grade during December, 1968, and January, 1969. The 24 boys and girls were very receptive to this unit at this time. We developed it as much as possible according to the teacher's guide. Usually the optional activities were done, too. Fifteen to twenty minutes were spent daily in the suggested activity. We stopped when interest was still at a keen level. The low achievers in the class were especially highly motivated as they were succeeding in the activities and were able to record the material.

The introductory games were good material for that particular time of the year.

Reference object and relative position were slowly developed with understanding, we felt.

The puzzles served as a further delight when they realized the sets and subsets that were involved. Position, distance, and arrangement were easier to detect by the slow learner. Much behavior growth was shown when they made their puzzle check cards. As a teacher I certainly made use of the idea that they compare and disagree; the next step was discuss and agree. Individual differences were provided for in this activity.

Finally Mr. O was introduced! We stressed art, language arts, math, and map skills or locations now. Our individual Mr. O's were red and had an adhesive white tape arm band and white reinforcements or reinforcement rings as buttons. When our principal, Miss Lillian Zeigler, visited our classroom, we did the activity--Mr. O in the classroom p.46. We might have spent more time on measurement here.

The Treasure Hunt or Explorer's Hunt was intriguing. We had an opportunity to use metric measurement. Some students made another solution for their hunt.

The stories of J. P. and Homer were favorites. We had no difficulty in making up our own J. P. and Homer stories.

We used the idea of Interest Grabbers several times during the year. The KEMS Newsletter mentioned microscopes. We used four microscopes and one stereomicroscope on a table near the door. Later this was changed to rocks and minerals of Kansas. Still another time we tried to learn and identify available science equipment.

In May the class decided that they would like to have a Parents Visitation Day at school. As it happened we had six days of this from

11 o'clock to 11:45 daily. Mothers and fathers were urged to attend during an early lunch hour for them. We had Reading (SRA), Social Studies, Mathematics-2 days, Science, and P. E. for them. Mathematics, Science, and Reading were best attended. The parents and students felt so much better about their progress and difficulties after this time. Each child had his parents sit next to him as they visited. They would like to do this again.

I tried using and making known the Behavioral Objectives of nearly all subjects in the curriculum. Some authority had stated that if children knew the objectives we would not really have to do much teaching. This really happens. I found that I did much less talking--as the year progressed--and the children did more learning. Learning became a pleasure or a "fun thing" for them as my way of teaching changed.

Sidelights

Frances Bruce

I feel that this discovery method of teaching can develop a higher or better sense of values and appreciation of other people.

When the Appolo Ten was orbiting the moon I asked my class of 23 first grade children at 9:05 a.m., "If you were one of the astronauts children what would have been the first thing you thought of as you awakened this morning?" A dizzy little blonde said, "Oh, that I had to brush my teeth." Then as I proceeded down the line receiving various answers a bright eyed little boy the youngest of eight children said, "Mrs. Bruce, I would have said a prayer that my daddy was still safe up there." Then we talked about who are the bravest people, the ones who are the adventurous ones who explore or the wives and children who must wait and watch.
(This group of children were very interested in all of the space program.)

When an animal, bird, rock or any object was brought into our room for identification or classification this group would work and work to try to identify it. After our unit on metals, woods, and plastics, a second grader brought an object that looked like a yellow stone or glass. Six weeks later this same little boy brought a large brown paper sack of these objects to school and gave one to each child in the room to examine. Then he turned to me and said, "Aren't you glad that I am in your room so we could discover that this is just melted tile."

One evening the parents and "my pride and joy" were watching TV while the older children were doing their homework in another room. When in the middle of the program Gary said, "Mother have you ever been spayed?" The mother slightly shocked said, "No, why do you ask?" He said, "Well you have never had any more babies since you had me, and I just wondered." They had taken their mother cat to the veterinary recently.

Teaching science and mathematics to twenty-three first grade children this year at the W. A. White School was a rewarding experience for me after gaining many helpful ideas from the group of teachers and instructors in the KEMS class last summer.

This group of children were more observing and did more classifying, measuring, generalizing, predicting, and experimenting that any group that I have ever taught.

An all day farm tour made early in October was the high light of this year. Two first grades of fifty children, two teachers, a student teacher, and a very understanding and observing school bus driver made this trip. We visited three farms. The first farm had horses, cattle and several hundred hogs from a few days old to those that were ready for market. The children observed and handled ear corn, shelled corn, silage in the pit silo and walked through the field where the alfalfa was baled. They saw large tractors, corn cutters, corn planters, and many other farm machines.

When we stopped the bus at the second farm "Midnight" a black goat met us at the bus steps and three large white geese gave us a loud welcome. A guinea hen had hatched twenty-two eggs the day before and the farmer's wife had these tiny guineas and their mother in the yard for us to see. She was able to catch several of the tiny guineas and hold them for the children to observe closely. A large white goose was setting on her eggs in a nest. A female white rabbit had a ten-day old family. The farmer's wife said that she had observed that this mother rabbit nursed her young early in the morning and late in the evening. We saw a three-day old calf being fed on a bottle.

The third stop was at our farm where we ate our lunch sitting on bales of prairie hay placed in our yard. After lunch the children and I dug carrots, beets, turnips, and a peanut plant. We picked green beans, cucumbers, tomatoes, bell pepers, red peppers, squash, pumpkins, and rhubarb. We picked pears from two large trees, and three kinds of apples. These apples were later made into applesauce and eaten with cookies and milk at school.

One of the pumpkins was used as a jack-o-lantern, another one we cooked another one we cooked and each child rolled out a piece of crust and made his own individual pie and baked it in a muffin tin. These pies were eaten as our refreshments at our Halloween party. We kept one or two of each fruit and vegetable we brought back to school on tables in the front of the room. We wondered and discussed what might take place and which fruits or vegetables would keep the longest. We observed the things that happened to these plants and what happened to those out of doors. We discussed what do you think happens to animals when they die. One pear dehydrated until it was dark colored and the size of a prune. The tomatoes spoiled first. The green and red peppers shriveled and molded. The turnips, beets, and carrots just dryed up to almost nothing. The cucumber, squash and pumpkin remained in excellent condition at the end of seven months. The children decided the skins of fruits and vegetables helps to protect them just as our skin protects us. The ones with thicker tougher coverings changed less. The pumpkin we cut open in April looked just the same as the one we used for pies in October. In November we always have a unit on Foods. As a culminating activity we planned to eat our lunch at school and prepared a vegetable stew. Each child brought some vegetable in a sack they told the properties of their vegetable and the class guessed what was in the sack. They learned what part or parts of each vegetable we eat.

All 23 children had an entry in the Science Fair run off in our building. Many of these entries were outgrowths from the farm trip. (One child had a mold garden of every type of fruit and vegetable he could obtain at the grocery store.)

The mathematics and science was correlated many many times. The distance to the farm and back to school, the time we left and the time we returned, use of a speedometer, number of seats on the bus and could both first grades use the same bus. When we cooked our applesauce and vegetable stew and made our pumpkin pies we measured amounts of ingredients and the time to prepare it. We counted the number of beans in the green bean pods, and predicted the number of beans in the next pod. We weighed and measured in different ways the vegetables and fruits we were keeping to see if they were shrinking or dehydrating. We counted the seeds in the apples we ate and used for applesauce. We made several histograms predicting the number of seeds in the next object. We used the terms larger than, smaller than over and over.

The children and I wrote up the trip and sent a copy home with each child. We used this material for reading, spelling and writing.

Towards the end of each term I teach a "Cowboy Unit" and have a "Round-Up Program" for the parents. On May 17, Saturday afternoon, twenty-two little cowboys and cowgirls were back at the farm to have a ride on a horse. This party is the "payoff" for reading 50 books. We bring a real saddle and bridle to school and learn the correct names of the objects that make up these. I have a former student, who is now in college, teach this part. They learn how to mount a horse.

Several little boys were standing on the board fence around the corral waiting for their turn to ride when one called to me, "Where are the blocks?" I answered, "What blocks?" One said, "Those blocks of salt the cows were licking when we were here in the fall." (Of course those blocks of salt were gone but the new blocks had been placed on the north side of the corral where the ground was dry.) Children when given the opportunity do observe and remember.

Arvilla Riegal

How I integrated science and math at Lakin Grade School this past year in first grade was in several ways. One of the very first ideas used was in talking of sets. On the bulletin boards I used sets of different pictures. Baby animals, flowers, and then a little later sets of water animals and plants to be used in our classroom aquarium. These were referred to as sets. We talked about sets of other things in our room. These were soon divided into subsets and properties of each given. The properties were listed on charts that grew throughout the year and were used a lot as reference points.

Later I brought my collections of sea shells to school and with a little encouragement, my students identified these using the library reference books, comparing notes, discussing their reasons for labeling each shell and then if someone found maybe a misnamed shell the reasons why it was misnamed and what it should be. These shells were then classified into general classifications and put on display in a trophy case and used by second, third, and fourth grades when they studied sea shells a little later. Not one shell was found by an older students help. The older students then divided our classifications into subsets for their uses.

Using the idea of pictures of animals I visited the Garden City zoo. We took pictures of each kind of animal as we studied in our classroom these pictures were introduced. Just before our annual trip to the zoo each child chose two pictures to write a story about, these contained things they expected to see or to find out about when they visited the zoo. On the days we went to the zoo the caretaker's wife went with us and talked about the animals. Some she let the children touch, others she fed and some she could only tell the children about. When we returned to our classroom each child wrote a second story telling anything new they had learned about their choice of animals. Several wrote stories on other animals that previously they had not found interesting. Only a very few children could not write anything new on their own choice of animals and everyone wrote something about one or more animals that was new to that particular child.

This class, although they were not the most capable class I have taught, did more reading on their own to find out new information thanks to the "inquiry" approach.

Marjorie Anne Frankenbery

There's a great difference between having fun with your class and in helping them learn with joy and pride. Fun just for fun's sake is not necessarily helpful.

The using of the child's natural curiosity about things to help him learn for himself must not be confined to just math and science areas. I have tried harder than usual to use this method in every area of learning in my own classroom. I hope I am not wrong in believing that my children this past year enjoyed more enthusiasm all year than classes I have had before. I know I was more relaxed and enjoyed it more.

Using properties and classifying into sets is a great way to practive math processes as well as using it for science.

Making a child more aware of the world around him can be used in every lesson, not just science.

Nature study can always be incorporated into a walk to another building no matter what the reason for the walk in the first place.

A weather station showing wind direction and velocity as well as a rain guage and an accumulative record of rainfall created much interest.

Predicting, inferences, observations and logic can be used so many ways when one is alerted to watching for them.

Salt crystals and sugar crystals from the year before were shown to the children. No information about them was given except to help create curiosity. You would not believe (or would you?) the numbers of things my class dissolved or tried to dissolve in order to learn what would make crystals. A chart of information was kept. I was amazed, too, at some of the results.

Larger blocks on the order of A blocks created much interest in a variety of ways. Almost every visitor was asked to take one from a paper sack and tell what its shape was without looking.

The bird cases from Mr. Schmidt were interest getters. I feel they learned much from these. In nearly every case they learned the identity without being told.

So, let's continue to try to lead the crusade for stopping the practice of spoon feeding information to children. Let's develop their wonderfully curious, alert minds in such a way that they will retain these qualities.

Margaret Waugh

My sixth grade constructed a sun dial. We used oaktag. A circle about six inches in diameter was placed on top of a fence post in an area of no shade. A wedge about three inches long was thumb tacked in position permanently. We marked the sun time every hour all day (a neighbor boy finished until sundown) Then we checked daily and observed how the shadow changed position. I hope to plot the difference another time. I might also make dials for standard and daylight savings times. Our area is very time conscious and is one extra reason such things are interesting.

I do not believe we were unique about the use of the Interaction kit. We did keep notebooks about interaction because the workbook was very "simple" for 4, 5, and 6 graders. In the notebook data was recorded, photographic paper was attached, pulley systems were copied and recorded, and many other details.

The ecology plots combined math and science. "How much twine is necessary to fence a 3-foot square?" was only the beginning. It was difficult to reach a decision about where to locate the plot. Some used burned prairie grass areas, a tree area, a board with grubs and unknown things under it, and 13 ground squirrel holes. The rains came and the plots changed rapidly. Each new discovery caused excitement for all.

We found the kits were very useful in the migrant children's program. One day I took batteries and bulbs to the children. Some were quick to light the bulb, others had no idea what to do. They were very ingenious about attaching propellers to the shafts of the motors. I believe the understandings and concepts of the S.C.I.S. program would be easier to present and more valuable to these transient children than any set of book learned and tested facts could ever be. The language that could be developed with the use of the kits could be terrific.

My Year of 1968 & 1969

Lora May Core

I had been a sixth grade teacher for years and had taught my science mostly from the textbook, but last fall my schedule was changed. I was assigned to teaching the sixth, seventh, and eighth grades in reading and English.

For years I had required a book report, either written or oral, from my boys and girls. Some of the children, especially boys, did not like to give reports from books. So I gave them the privilege of giving their reports on anything that appealed to them. I received many reports on science and nature study.

Reports were such as: the nesting habits of birds native to Kansas; the kinds of birds stopping over for a rest on their way to the south in the fall and to the north in the spring. We are in the Central Flyway of the United States and see many kinds.

The reports on science such as: the working of the bees, the ants, the beaver, and such nature study. I gave the credit to each on his English. Some wrote on jet engines, the fuel used, and even on the space ships. These things were way above my head, but I read and checked every paper. I checked for composition, spelling, punctuation, and sentence structure. I applied the credit to their English. This pleased the boys as it helped boost their grades.

I know this is not a way of teaching science and I didn't do this with the purpose of teaching science, but boys like science. So I got good cooperation and participation from each class, especially the seventh and eighth grades. This gave them an outlet and still helped them. They were very grateful, and I get a great satisfaction from helping them in any way that I can.

Happiness is giving. I think one should be happy in what he is doing.

A Make Believe Museum

Gladys Cummin

This class project of a make believe museum is built and maintained by the children for the purpose of teaching math and science together. I got the idea from the S.C.I.S. guide in Activity 9 where it suggested that children be encouraged to bring in objects made of one or of more than one material to place on display in a "Material Museum."

Many of the suggestions which I give in this paper were used, some were not. I plan to use all the following suggestions and to add more plans this year as we progress.

After children have been introduced to the idea of sets and set language, have each child bring to school a set of objects. First have the children identify and describe their objects by properties. After children have become familiar with texture, color, size, shape, and weight words in identifying their set of objects have them note similarities and differences between their set of objects and other objects other children have brought.

After children have counted, sorted, and identified by properties their objects introduce to them the word "Museum." Ask how many have been to a museum, also what would they expect to see at a museum. Talk about museums, try to guide the children to do most of the talking, telling about their knowledge and experience of museums. Then make plans with them to visit a museum.

After the field trip to a museum and the children have discovered the fact that all objects are made from materials, suggest to them the idea of using their own sets of objects to build a material museum. Let children arrange their objects in various ways according to color, size, shape, etc.

Then encourage them to bring more objects. Arrange these in exhibits, label their objects the way they dictate that they be labeled. Suggest to them a guide is needed to explain to visitors about the various exhibits. Give each child an opportunity to visit the museum, and also a chance to act as a guide.

Plan with them about an admission charge (using play money), a time of day for visitors. Various jobs such as ticket seller, guide, curator, janitor, and caretaker are discussed and children take turns until each child has taken turns acting out these various jobs.

As the museum grows the children are quick to realize more space is needed for their displays. Soon problems arise such as these. How long will this shelf need to be? how wide? If covered with oil cloth or paper they will need to know units of measurements, thus they will gain a concept of area, surface, etc. Needs such as telling time, making change, etc., will arise and these things can be taught to them as they create and maintain their museum. Of course the guide will need to know many things to guide the visitors.

It will be only a short time after the building of display areas that the children will recognize that their museum looks like a hodgepodge of junk. If possible take another visit to a museum to find out how a real museum displays their exhibits and how they maintain their records. Soon children will be keeping records and will be grouping and classifying objects.

We built a material museum in my room last year but only made one field trip. Next year I plan more than one trip. The second semester I did not do much about the museum, but next year with better planning, etc., I plan to keep the project going all year. Also any parent who has a special hobby or talent pertaining to science or math will be invited to talk to the children. These talks will be called "Museum Lectures." I hope to have at least one lecture a month plus two field trips a week. Many of these nature walks or field trips will be conducted on our school grounds to study or observe problems that have arisen in our museum. Some will be conducted to find things for our museum.

This is a poem the children composed with very little help from me. I printed it from the chalk board and it was displayed on our art easel to explain about our museum. We will make another poem next year. It will be different because different children will be making their contributions:

Visit our material museum and you will see
Many objects of interest to you and to me
We arrange these in sets and we all agree
Every material here has a name property
We sort them according to shape, color, and size
We use comparison signs
Because we are wise
Sign our visitors record and ask our guide
To show you these materials from far and wide
Ask our guide to name some properties too
This for you he will gladly do
You are welcome to visit here any day--We don't call
this work--We call it play!!

Christine Minnick.

Between the Halloween and Thanksgiving season last year our first and second grade classroom coorelated a math and science unit, using pumpkins.

A pumpkin was placed in the center of each group of tables throughout the classroom and one on my desk. For several days the children were free to observe, touch, lift, or smell the pumpkins whenever they wished, but in so doing they were encouraged to think of the properties on the outside of the pumpkin.

Later the group was called together and an experience story was written by the class dictating the story. Such ideas as greater than, less than, larger, smaller, heavier, lighter, more, fewer, taller, shorter, wider, narrower, etc. were encouraged as the children were comparing the pumpkins from the different tables.

The tops were later removed from all the pumpkins at the tables. Children then discussed inside properties of the pumpkin. Each group counted the seeds in their pumpkins to see which groups' pumpkin contained the most, the least, the largest and smallest seeds, etc. As each table counted their seeds the entire class counted with that particular group. One child made the comment that he didn't know it but he found out the numbers go on and on. A histogram was made and on the results of this a prediction was made as to the number of seeds that were contained on the pumpkin on my desk. Comparisons were made and then the second experience chart was written on the basis of the data collected.

The seeds were then dried. A part of them were stored to be planted in the spring, the rest saved for snacks to be used later. (Place in electric skillet and butter. Fry until browned and crisp. Salt.)

Enough pumpkins were cooked to make pumpkin pies for our class. (Discussed changing form of pumpkin when heat was applied) Measurement was discussed by our class members as they followed the pumpkin pie receipes.

After the pies were baked they were served with milk during our milk period.

I observed that the children would reread the pumpkin experience stories many times throughout the year. When visitors entered our classroom some of the children were always eager to tell them about our experiences with the pumpkins.

How I Coorelated Science and Math

Dorothy Brakebill

When school opened last September the children were so curious about the boxes setting in the windows.

All of us were strangers. We had not had any previous interaction with each other.

I was handed a sheet with their names.

Nothing else! Later I had more time for understandings.

There was not much time for getting to know each other that day. It was all pretty confusing.

We had lots of interruptions too and being in a portable had its advantages and drawbacks too, we learned later.

Three days later on a Wednesday I walked over to the material object boxes and pulled out a box of shells. All eyes were riveted on the teacher. Some had begun to hum, others chuckled, and one little boy hopped around on one foot. (I think they may have peeked in the boxes earlier. However, they love surprises.)

I asked them to divide into groups of seven. There were 28 children. We handled the shells and talked about them. We spent considerable time doing this, then we began to really settle down and work with the shells. First we counted the number of shells in each group. Then we looked for different colors on each shell within the group. Sizes were discussed, big, medium, and small (tiny, too). We talked about roughness and smoothness, too, also dents (grooves) in shells. One small boy said, "They look like a roly poly, too." Did anyone have all small ones, or all big ones? Can we count how many shells our group has? Can we see how many colors our shells have? Can we feel of our shells and tell whether they feel rough, smooth, hard, or soft?

After we had established an understanding for the meanings of the terms we had used for talking about the shells we then prepared for listings these different groupings on paper.

Since I could not always understand their word expressions we had quite a time communicating with one another as we wrote a story on the board about our shells. I decided that perhaps this would help them feel more relaxed and less shy with each other and me.

Next, math in the form of groupings, counting out and arranging shells in sets and subsets, one to one matching, pairs, etc. We began counting as many other objects in the room as we could (how many books do we each have? windows? doors? blackboards? etc. Write down the number. Counting aloud was practiced.

The first day when we wrote our names several children had writing problems. All were, of course, still printing, and much of their writing was illegible. We traced letters with unsharpened pencils on paper and in the air. Dowel rods were used too for this.

Counting with dowel rods, making figures, handling them, and comparing "notes" with each other helped too. They were beginning to express themselves with greater meaning for me and for each other.

The stones were used too for learning more about "tens." "The stones were so cool," they said.

The rods were now used to describe and tell about numbers or bundles as our book calls them. Also, Lincoln's home was made of logs. (They built a small log house and counted the number of logs used.) Kansas was better understood history-wise when they built the log cabin placing a log fence about it. Who had lived in the log cabin? Where had they lived? Were there children? Who are pioneers? They chuckled when I repeated this word. They enjoyed saying it. It was quite an interesting study that we became involved in. We studied and learned about Jayhawkers too, and found out who they were.

Material objects were fun and gave my children many insights into math, science, reading, and spelling and motivated my group for an improved learning experience.

Cooking Activities as a Method for Teaching Math and Science in Kindergarten

Karen Lowery

Planning cooking activities for kindergarten children is not a new idea but the children's active involvement in the activities of cooking this year provided more avenues of learning than I anticipated. Awareness of the five senses, interaction and change in matter, measurement, time, counting, data recording, predicting, and inferring all grew out of our two cooking sessions.

Pumpkin Cake

We began at Halloween time by getting two pumpkins for each session of kindergarten. The properties of the pumpkins were observed before and after they were cut open. The children took turns cleaning out the seeds. These were dried and planted in the spring. We cut the pumpkin into pieces and attempted to eat raw pumpkin. Pieces of the pumpkin were left on the table where a mold soon grew. (It probably would have been best to cook the pumpkin and use it for our cake. However we used canned pumpkin.)

We discussed the various ways we might fix the pumpkin to be more edible. It was decided to make it into cupcakes. The day before baking day we assembled the cake ingredients for a "tasting party." Our "party" consisted of each child being allowed to touch, smell, and taste each ingredient needed for the cake. The ingredients were examined with magnifying glasses. Using the overhead projector and clear plastic lids filled with water we stirred flour, sugar, cinnamon, salt and such into the water. Some items clouded the water in their lid and appeared dark on the screen. Other substances appeared dark at first but as we continued to stir the water cleared and the ingredients had "disappeared." Wanting to know if the ingredients were still in the water we laid the lids of water aside to be kept. As the water evaporated and left a residue behind, we tasted it and found it to be the lost ingredient.

On the actual baking day we discussed the measurement of ingredients, the following of a recipe, and how to time the beating of the batter. Measuring cups were left at the sink for water play. Each child measured 1/3 a cup of batter into a muffin cup. He observed the properties of the batter and tasted it. One muffin cup of batter was left on the table while the others were taken to the oven. Time was again noted as we waited for the cakes to bake. The children watched the cupcakes through the glass door of the oven and saw the batter change size and shape. After the cupcakes were baked we compared them to the batter not baked. We noted the interaction of heat and batter, but no conclusions were reached as to how or why the change occurred.

Applesauce

Several weeks later we made applesauce. Again we wrote and followed a recipe. Each child brought an apple. We observed the properties of an apple's insides and outsides.

Each child guessed at the number of seeds in his apple and then cut it in half with an ordinary table knife. We discussed the fractions ½ and ¼ as we quartered the apples. Each child counted his seeds and marked the number on a histogram. We then predicted the number of seeds in several additional apples. These apples were eaten raw to be used in a comparison of taste and texture with the cooked apples. The children each placed their apple quarters, a tablespoon sugar and ten red hots in the electric skillet. No water was added to the skillet. As the children took turns stirring the mixture, they noticed some sugar changing color and a liquid appearing in the pan. Beads of water were noticed forming on the lid of the skillet. A movement in the air above the skillet was noticed. We tasted the drops of water on the skillet lid. The children were sure it was water but could not understand where it came from as we had put no water in with the apples. After the apples were cooked and the skins removed we compared the sauce to some uncooked apples. In this entire activity we had once again noted the intereaction of heat. The change in matter was from a solid to a semi-liquid. Our pumpkin cake showed a semi-liquid changing to a solid.

Jello

The last cooking experience was the making of jello. We tasted the jello powder, observed the water as it began to boil, and noted the steam and condensation on the lid of the pan. Ideally each child could stir the jello powder into his container of hot water and note its dissolving. The overhead projector and a clean lid again might show that the powder did dissolve. We placed most of our jello in the milk cooler. One small container was left on the table, one was placed out of doors. (It was a cool day.) We observed the change in the liquid and made some inferences as to the proper temperature for jello to become a semi-solid. After we ate the firm jello, a container of firm jello was left on the table to see if another change in form would occur.

I felt there was a great deal of value in each of these cooking experiences if they had been done alone. However, the cumulative value of the three distinctly different kinds of changes in matter presented in a six weeks period greatly heightened the children's awareness and the value of the activities. Each previous activity was fresh in their memory and could be used in comparison to the current activity. Measurements and time skills were used purposefully in each activity.

Phyllis Anne Brady

Several tuning forks of various frequencies were put out on a table so that each child could investigate them during the daily work time. With the hope of protecting the tuning forks, the teacher did demonstrate how the tuning fork could be struck against the heel of one's hand. However, there were those children who found this hard to do and at times painful, so in an attempt to find a substitute for the metal edge of the table which they found easy to use, the teacher put out small wooden building blocks which then suffered dents. Finally, the teacher found that striking the edge of a coffee can which was covered by its plastic lid was satisfying for most of the children.

The teacher's role was to observe what the children did with the tuning forks and said about them, to ask questions which led them to better observing and to provide materials for them to use in experimenting with the tuning forks. Added to the tuning forks on the table were such things as the wooden blocks, the coffee cans, pieces of typing paper, boxes made of thin cardboard, bowls of water, and (by accident) a cardboard backed puzzle. Initially, all children either discovered or were shown that the tuning fork could make a sound. From then on the children individually responded in various ways to the materials. Some less mature and less alert children continued to enjoy just striking the fork and hearing the sound. Others as they manipulated the materials put the sounding tuning fork against the side of the coffee can, against the cardboard box, and against the paper. As one child would get a pleasing result, another child would repeat what the first child had done. When the puzzle happened to be there, one child touched it with his sounding tuning fork and the puzzle pieces moved. When another child touched his sounding tuning fork to the plastic coffee can lid which had saw dust on it, the saw dust "jumped." Water splashed when the sounding tuning fork was dipped in it. The tuning fork "tickled" when it was touched by one's fingers or put against one's face or ear, but it also stopped making noise if it was pressed too hard against something. Besides these observations children saw that the fork continued moving back and forth as the sound was being produced. It was around this time as the children had made observations involving sight, touch, and hearing that the teacher introduced the word "vibration."

"I'm making a guitar" seemed to be the natural reaction for most children when given rubber bands and cardboard boxes. It was very obvious too and verbalized by many children that the rubber band "vibrated" when it was making a sound.

Class interest grew in things that vibrate and it seemed that many children did see a relationship between sound and vibration. With this background the examination of classroom rhythm instruments was very exciting. "What part is vibrating?" and "What happens when I hold it tightly?" were repeatedly asked and answered by children giving them more evidence for their initial understandings about sound and vibrations.

Each child was given a large soda straw and told to smash one end of it and then the corners of the smashed end were cut off. The children blew on the smashed end. As they experimented with ways of blowing, most children were able to produce a sound and became aware that at the same time as the sound they felt a tickling vibration on their lips. Here was another chance to test their understandings.

While it was hoped by the teacher that after these kinds of experiences the child would have developed the understanding that sounds are made by vibrating objects, the verbalization of this understanding was only one kind of observable evidence that the child had developed some skill or already had skill in observing and drawing conclusions. These skills were the main goals for these activities, not the understanding by itself.

Having done the above "science" activities the teacher chose to emphasize with the class two different areas that were among their interests that grew out of these activities. One area involved music. Having had experience with the rhythm (percussion) instruments, the "guitar" stringed instrument, and the straw wind instrument, the children were involved in activities which exposed many children for their first time with the various families of real musical instruments. The children visited the instrumental music classes, visited a junior high school band, and were allowed to try to play some real instruments.

The other area which really was not absent from the other two areas of learning but which did have specific activities planned for it was language development. Activities were planned for the purpose of building concepts and building the vocabulary to describe these concepts. Many of the activities for building concepts of loud, soft; high, low; and long, short, as well as some other descriptive properties of sound were taken from the AAAS exercise "Perception of Sound" (Science - A Process Approach, Part A, Observing 4).

Teaching Probability

Dave Knorr

Theoretical probability-according to theory if you were flipping two coins, you could have any of these possible combinations or outcomes:

Heads	Tails	Heads	Tails
Heads	Tails	Tails	Heads

According to theory if you flipped the coins 500 times, ½ would be head/tail combinations, ¼ would be tail/tail combinations and ¼ would be head/head combinations. In other words (according to theory) this is what should happen.

Empirical probability--We all know what should happen does not always happen. Empirical probability is obtaining results through experimentation. Through experimentation we might find that head/tails only occurred 239 times, head/heads 136 times, and tails/tails 125 times. Empirical probability always relates to what actually happens whereas theoretical probability relates to what should happen.
(Much of the above came from A.A.A.S.)

After working through several activities that were designed to give the children operational definitions of empirical and theoretical probability, I constructed the following activity as a culminating activity with our work on probability.

PROBLEM: Can we predict what is inside a milk carton without ever looking to see what is inside?

MATERIALS: 15 milk cartons, 60 marbles (assorted solid colors, red, green, etc.)

PROCEDURE:
1. Give each lab team a milk carton with 4 marbles in it. (Do not let them look inside.)
2. Instruct children to draw one marble from the container 20 times. Each time they draw a marble they should return it without looking at the others.
3. Instruct the children to keep records of their results. (tally marks)
4. After drawing marbles from the containers 20 times have the children predict what they think is inside the container. (probability through experimentation)
5. Rotate the milk cartons throughout the room so that each child has had an equal opportunity to work with each.
6. After completing the above compare the results that different children obtained.
7. After all predictions are tabulated, open the milk cartons and find out whether the predictions are accurate.

Interaction

Wauneta Engler

One child brought these things from home:

Large flat plastic bowl
4 tablespoons water
4 tablespoons bluing
4 tablespoons ammonia
4 tablespoons salt
Food coloring
Pieces of sponge
Egg-sized rough rocks (6 or 8)

Directions:

Wet rocks and sponges, squeeze water from the sponges, and then place in the bowl. Pour the above mixture over these. Add food coloring by dropping it in various places over the rocks and sponges. Set back carefully and observe. If desired in about two days add one half the above mixture to boost the interaction or just add water carefully.

Later these and other materials such as soda, lime, etc. were put out in order that other children could experiment. A record was kept as well as the procedure of the later experiments. Some brought their materials from home. I found this very helpful in a better understanding of fourths, halves, etc. in liquid and dry measure as well as a good prediction lesson. (Should not use anything made of metal in this experiment.)

Sock Survey

Our comparison of children's clothing led into a sock survey. A simple bar graph was made on the chalkboard showing the various colors of socks worn in our room. This led to survey the socks in the other third grade room. At break time two children were selected to stand in the hall and count the other children's socks and the color and bring the results back to the room. With these results each child constructed his own bar graph using crayolas to represent the colors and an inch measure for each child wearing that particular color.

Later the children wanted to compare the socks of the first grade room with that of the sixth grade room. By this time they had observed that children wore different lengths of socks. These later graphs were made by pairs of students and the results reported to the class. This led to a great interest in predictions, different scales of measurements, as well as an interest in making graphs on other subjects.

Galen Long

If you teach in a system where the principal or system doesn't believe in the new science programs or if they believe in these programs but decided to get new books instead, then all is not lost.

One can still use the discovery-inquiry method to teach science. It's more work for the teacher but well worth the time and effort. The following is the way I have done my science this past year (and from the looks of things all next year, too).

You, as the teacher, must first go through the lesson and decide what you want to teach. Next, you must think up experiments that the students can perform and to teach these concepts.

For example, one of the lessons I taught this past year was on fire. As we know it takes three things for a fire to burn: heat, air, fuel. I developed experiments to show each of these experiments that the students could perform by themselves.

Of course, most students in the second grade know about the old air trick with the jar and candle, but how many people have jars large enough to cover a couch, a car, or even a house? This was the type of fire we were studying (I was working with 6-7 graders). There are other ways to cut the air (oxygen) off. One way is carbon dioxide as compared to oxygen.

We had other experiments for the heat and fuel. This method does take more time than just using the book but the students gain much more and develop their own theories and test them. They retain these concepts much better. Why? They can think back to the experiment and recall what happened.

How I Integrated Math and Science

Harriett Martin

In my classroom we had several activities that integrated science and math. We used a button collection for a starter. We arranged buttons for shape, color, texture, as well as for sets and number combinations. Greater than and less than were shown.

Another activity was for three colorless liquids. White vinegar, water and Seven-Up were compared in sealed jars. Then the children discovered if they used litmus paper in the opened jars there was a reaction. The students had to find out why the litmus paper changed color.

Another activity was on popcorn. The students saw the corn as it grows on a cob. The shelled corn was put in a corn popper where the children could hear the interaction that takes place when it is heated. They heard the corn pop, they smelled the popcorn, they could see the change in appearance in the corn, and then they tasted the popcorn. The children loved this experiment.

Cutting an apple across shows a perfect star formation. (We had just read the story of Johnny Appleseed). The apple was then cut into fractions and each child in the classroom had a fraction of the apple. Good for fraction study.

We also used oranges for predicting the number of seeds. After the seeds had been counted, the orange was separated into fractions. This is an excellent way to start the study of fractions. (Also good for health study of Vitamin C).

The children loved the raisin bread and chocolate chip cookies predicting activity. They learned to estimate and then find averages of the raisins and chocolate chips.

We started each day by predicting the sun rise and sun set for each day. One student would then compare the student's guess with the information given each day in the newspaper.

The slide rulers made from a yard stick were good for adding numbers. It helped a few students in measuring small items. None of my students had ever heard of a slide ruler.

I believe all of the students loved the gold fish experiment. A group of students counted the number of times a fish gill goes in tap water, the number of times the gill goes when hot water has been added. The number of times the gills moves when ice cubes have been added to the water. The students learned to read a thermometer and keep data.

The use of a microscope for each student opened up a new world for my students. They examined cloth, nylon hose, hair, paper, cork, and onion skin and recorded this information. The students learned to observe and record this information.

Mr. O. made the children more aware of directions and positions as well as speed.

Temperature reading and record keeping were an every day activity. The measuring of snow and rain were always interesting events. (Good for study of weather found in our science study.)

The experiment of floating and nonfloating objects was a fun experiment. Many objects from home were brought to school and tested for their floating abilities.

We had a bag of scraps of material for showing materials for wearing in cold weather and materials for hot weather. Color and weight of material are important in selection of wearing the proper clothes. Math signs can be used here.

The grinding of cube sugar and rock candy showed how a substance can change form and still be the same material. Math signs used.

Seeing models of farm animals and model dairy farms that is obtained for free from the Dairy Council makes for a good use of science and math. The study of Pasteur and diseases was interesting. Math can be shown by listing and counting diseases we can get by not being clean or not observing proper health rules.

We had fun with science this year. The poor readers were very comfortable in doing this type of science. The good readers did a lot of research and added lots of learning and sharing with their friends.

How I Integrated Math and Science

Eleanor Nelson

Our class collected samples of flowering shrubs (forsythia, lilac, etc.) early in the spring, and forced them to bloom in the classroom. The children learned that not only water and sun was necessary but the warmth of the classroom forced the plants to bloom. They did predicting to see which would bloom first. The children watched to find out if leaves or flowers appeared first and discussed differences and likenesses.

We took a nature walk and observed first hand the wonderful world around us. The children searched areas in the sun, damp shaded spots under bushes and burnt areas to find out how and where organisms lived. From this trip the children:

1. collected rocks, leaves, a dead burnt-to-a-crisp frog, etc.
2. observed water pollution
3. discovered bird nests
4. mounted specimens
5. discussed conservation
6. observed erosion
7. discussed directions

To integrate math, we made a map of the park area and of the walk to the park. We made a chart showing the balance of nature and how this balance can be destroyed.

The children brought in many kinds of flower and vegetable seeds. They were put on trays and observed for differences and likenesses. Each child brought dirt and planted two or three seeds in a milk carton. We made a chart to predict which seed would germinate first.

red x = zinnia
blue x = bean
green x = popcorn

Planted April 8, 19

Date	No. of Days											
April 20	12	r	b	b	g	g	g					
19	11	b	b	g								
18	10	r	r	r	r	r	r	r	r	r	r	r
17	9	b	b	b	b							
16	8	g	g	g	g	g	g	g	g			
15	7	g	g									
14	6	r	b	b	b	b	b	b	b			
13	5	b	g									
12	4	r	r	b	g							

Our chart used 21 days which took the date to April 29. After the seeds germinated, each child measured his plants and kept a graph to show the growth.

While this was occurring, the children observed lima beans which they had put in a large tray full of maish sand. After a few days, each child split his bean to find out what was happening and to discover for himself the various parts of the bean.

I would like to mention that one of the children's mother was a nurse and she saved syringes, plastic tubing, plastic jars and plastic cups for the room. I also got syringes from the veterinarian.

Carol Garcia

It seems to me that I have taught more math and science facts... more lastingly and meaningfully...than in all the rest of my teaching life, which covers a span of nineteen years. The process approach to teaching science, especially when correlated with allied subjects like math, social studies, art, etc. provides the highest degree of transfer of training because it brings out the common elements from all subject areas, and lets the child see how the curriculum is related. It shows the child how the tool skills from one area can be used to advantage in another subject. For example, my students learned to graph and make histograms in science and math. They found it to be such a useful tool there, that they used it to relate other information to me. One of my fifth-graders related his social studies report, the battles of the Civil War, in statistics, using line and bar graphs. It was well done, and very interesting. Another charted the progress of his illness on a histogram using the horizontal coordinate to list the days missed and the vertical to chart rise and fall in temperature. The element, graphing, had become a natural part of these students' thought processes, and they turned to it automatically as one way to give information. It was a continual delight to see the children correlate tool skills. In essence, then, the process methodology helps the product, content.

Working with SCIS in the KEMS Workshop has made me a happier and more relaxed teacher. I have really enjoyed teaching math and science for the first time since my career began. As the children became totally involved in the process approach to learning, my role changed from a dispenser of knowledge to that of guide. Kahlil Gibran, the philosopher, sums it well, in his discussion of the role of the teacher:

> "If he (the teacher) is indeed wise, he does not bid you enter the house of his wisdom, but rather leads you to the threshold of your own mind."

The children have found this to be true, that they are happier and enjoy learning more if the teacher leads and does not push. They speak for themselves in their letters to Dr. Crumb evaluating their work with SCIS this year.

The process approach to learning provides a means to elicit fine independent thinking. The emphasis the approach requires for valid evidence to support observations and statements results in the highest quality discussions. Inquiry itself results in helping the children to grow more keenly aware of their environment, to interact with it more efficiently at ever higher levels, that ultimately culminates in diversity and improvisation that knows no limits. For instance, while studying a unit on the human body and lving organisms, we were studying "aliveness" and "deadness". We had arrived at our definitions through the dictionary and discussions, then, we had an object hunt to find living and dead things. After finding obvious ones, the children found a bird's nest obviously abandoned, and could not decide if it was living or dead. A fierce debate ensued. Most of the children thought it was dead, but a few thought that it might be alive because "even though it looked like it was dead, it might not be because sometimes, live things, like seeds, looked dead; and just because the materials that the bird had used to build it with looked dead, they might not be dead." This explanation did not satisfy the "deads", and the "lives" were just about to give up, when a little girl in their group said, "Let's plant it. If it grows then we win." So the children planted the bird nest in a flowerpot, and watched it assiduously. It grew. Now I ask you, what other method of science would cause you to grow a bird's nest?

APPENDIX C

901 Schwarz Road
Lawrence, Kansas
May 28, 1969

Dear Dr. Crumb,

Before we had S. C. I. S. I thought science was very boring. All we ever did was read and take tests. But now science is my favorite subject. We get to do expeirments with chemicals now. I think that everry expeirment in the book is very good and fun. Sometimes the reports are kind of hard but that just gets us used to being real scientists. So my opinion is that I like the S. C. I. S. system very well.

Sincerely,

Renate Razak

901 Schwarz Rd.
Lawrence, Kansas
5/28/69

Dear Mr. Crumb,

I have enjoyed working in the Scis kit very much. It's much better then working in a book all the time. We get to work with chemicals and other things. We are able to prove things for our selves. We feel like true scientists when we mix chemicals, and make histograms, and put together a whirly bird. I'm very happy I got to work in the Scis kit. I like it very much.

Sincerely,

Laura Hedges

Sunset Hill School
901 Schwarz Road
Lawrence, Kansas
May 28, 1969

Dear Mr. Crumb,

I have enjoyed the S. C. I. S. kit very much this year. I think it is very wonderful. You get to learn things by doing them and finding out things for ourselves. Sometimes things come out different than we think. There are no straight answers as in a book, and sometimes answers differ. In some places you may do something a different way than another. I can find things out, and learn how to find things out.

Sincerely,

Dennis Haack

901 Schwarz Rd.
Lawrence, Kansas
May 28, 1969

Dear Mr. Crumb,

The S. C. I. S. kit is real fun because I like science and those experiments are fun. The things with the Whirly Birds were lots of fun. The time we had to Separate the sand, salt, and iron filings was lots of fun too. I hope I can have the S. C. I. S. kit next year.

From,

William McKinney

Sunset Hill
901 Schwarz Rd
Lawrence, Kan.
May 28, 1969

Dear Mr. Crumb,

I enjoyed the S. C. I. S. kit this year very much. I think that it has a lot more learnings in it than in the text books. I like the kit because it has different experiments in it, and they are fun and interesting. I also like making the reports on the experiments sometimes. Well, I think that the S. C. I. S. kit is great.

Sincerely,

Dana Olsen

3009 w. 6th
Lawrence, Kansas
May 28, 1969

Dear Dr. Crumb,

I really like SCIS because you are never really wrong, you can just misspell, or something like that. Another reason is you are on your own, working with chemicals that you don't know about to much. Of course its not very fun to write up but thats just part of it and you get used to it. It's fun but it teaches you and that's a good combination. The older text was fine but awfully boring at times. This is interesting but you can't goof off. That is why I like SCIS and think other children would, too.

Sincerely,

Leslie Rose

Sunset Hill School
901 Schwarz
Lawrence, Kansas
May 29, 1969

Dear Mr. Crumb,

I think the S. C. I. S. kit is great. I like it because we get to do fun and interesting experiments. I like science lots more now since we got the kit. I think the Science books bored me, and I didn't get anything out of it. I like to take on the responsebility to work with and use the chemicals.

Sincerely yours,

Brent Barnes

901 Schwarz Road
Lawrence, Kansas
May 28, 1969

Dear Dr. Crumb,

I really enjoyed working with the S. C. I. S. method of science. The reasons I like it so much are because the S. C. I. S. kit gave us a chance to do experiments and find out ourselves just what happens. The kit and books gave us a chance to do more science writings. I don't like to read the dull text books because all there is to them is reading. This method of science really doesn't teach us much. But your method was alot of fun and it taught us alot.

Your friend,

Debbie Floyd

P. S. I hope we can expand the S. C. I. S. program in the future!

901 Schwarz Road
Lawrence, Kansas

Dear Mr. Crumb,

I love your S. C. I. S. Kit for boys and girls. The reason I like it is because it isn't boring like the text book. In the S. C. I. S. Kit our class never knows what were going to do. I hope they have it in every school in Kansas next year.

Sincerely yours

Larry Caine

Dear Mr. Crumb

Mr. Crumb I like the S. C. I. S. kit becous it has good science in it. And I enjoyed it. And I learned from it.

Thank you.

from Roger Hermansen

APPENDIX D

KANSAS ELEMENTARY MATH SCIENCE

No. 2
October, 1968

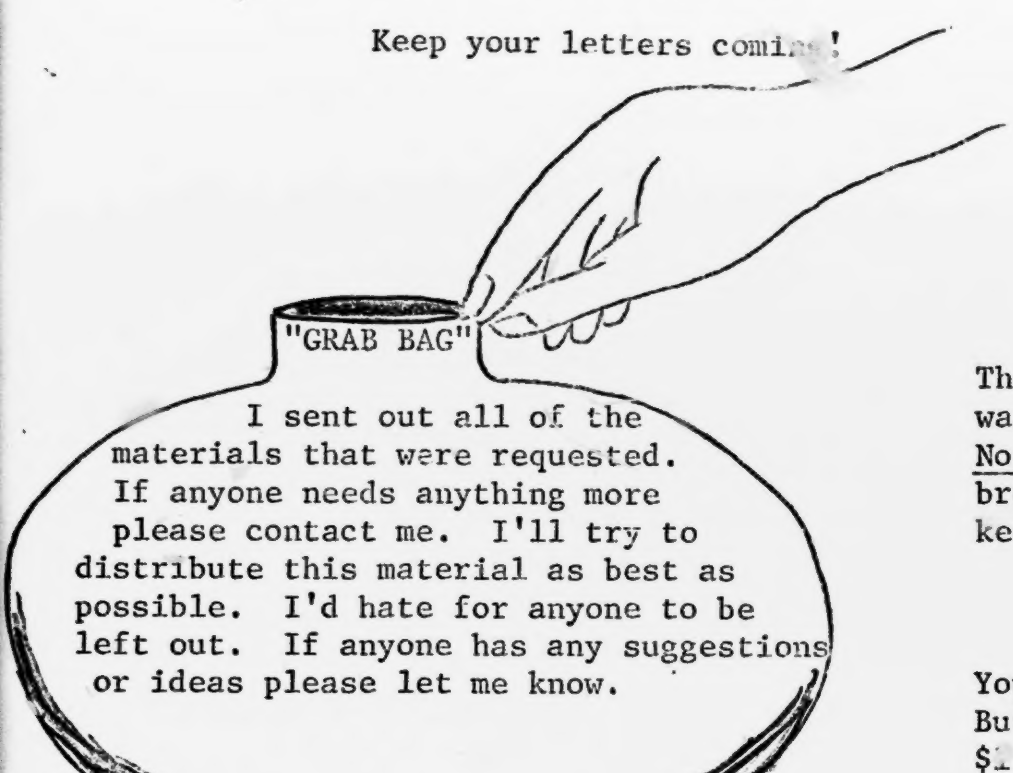
Science Center
1427 Highland
Emporia, Kansas

Hi,

It was great to see all of you and hear all the wonderful things you have been doing. It really gives me a thrill to work with such unique and creative people.

Keep your letters coming!

Ramona J. Anshutz



"GRAB BAG"

I sent out all of the materials that were requested. If anyone needs anything more please contact me. I'll try to distribute this material as best as possible. I'd hate for anyone to be left out. If anyone has any suggestions or ideas please let me know.

"KRAZY KATS"

The turn out at the Salina meeting was fabulous! Our turn out was 90%. Not only that! Nearly all of you brought other people with you. Let's keep up the enthusiam.

"BUTTON BOX ANYONE?"

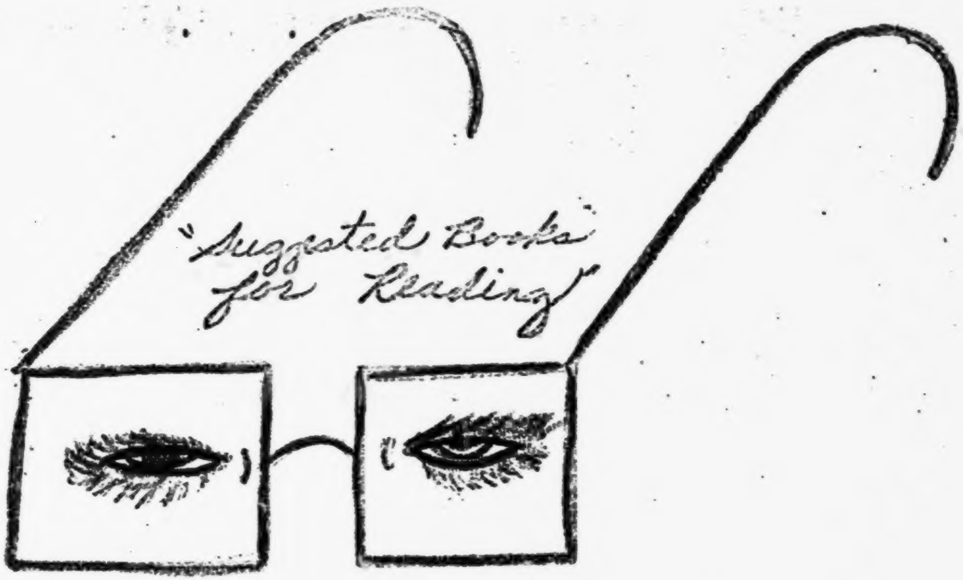
You can get 1001 buttons for "Grandma's Button Box" from Sears Catalogue for $1.98.

FROM THE DIRECTOR:

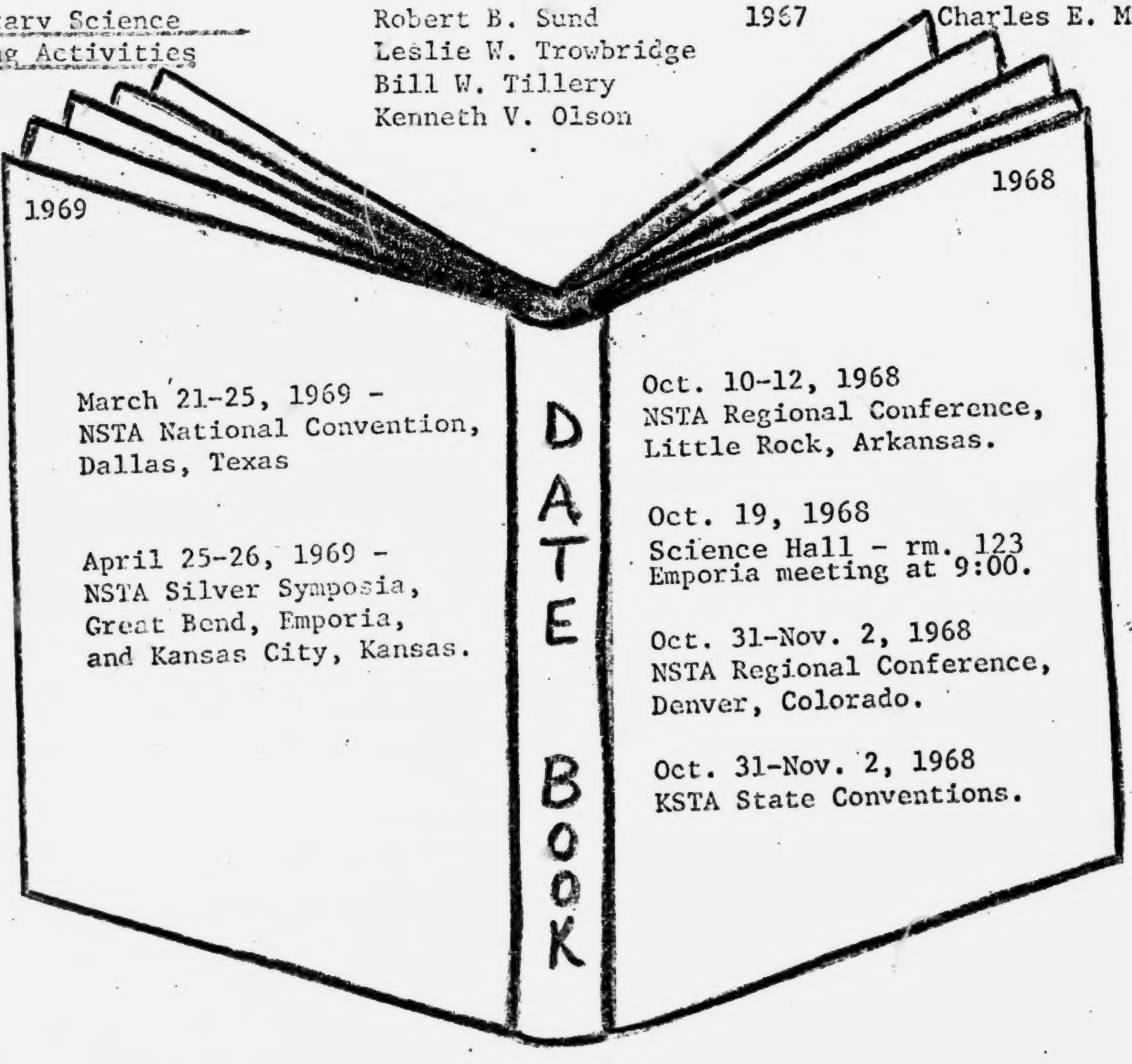
Because of limited project funds the following policy will be used in loaning the ESS kits to KEMS teachers.

1. No more ESS kits will be loaned from our present supply source.
2. Materials on loan now should be returned on or before October 19, 1968 unless the schools having the materials wish to replace broken and expendable items in the kits.
3. If kits are kept beyond October 19, 1968 please provide the KEMS Center with an inventory of items in the kit on loan.

It is with regret that this new policy has to be instituted but it is hoped that through trial use of materials, school districts and teachers will discover the value of the materials in their instructional program.



Process of Education	Jerome S. Bruner	1960	Harvard University Press
Teaching Science of Everyday Things	Victor E. Schmidt Verne N. Rockcastle	1968	McGraw-Hill, Inc.
A New Look at Elementary School Science	Robert Karplus Herbert D. Thier	1967	Rand McNally & Company
Preparing Instructional Objectives	Robert F. Mager	1962	Fearon Publishers, Inc.
Elementary Science Teaching Activities	Robert B. Sund Leslie W. Trowbridge Bill W. Tillery Kenneth V. Olson	1967	Charles E. Merrill Book



March 21-25, 1969 -
NSTA National Convention,
Dallas, Texas

April 25-26, 1969 -
NSTA Silver Symposia,
Great Bend, Emporia,
and Kansas City, Kansas.

Oct. 10-12, 1968
NSTA Regional Conference,
Little Rock, Arkansas.

Oct. 19, 1968
Science Hall - rm. 123
Emporia meeting at 9:00.

Oct. 31-Nov. 2, 1968
NSTA Regional Conference,
Denver, Colorado.

Oct. 31-Nov. 2, 1968
KSTA State Conventions.

INTEGRATING MATH AND SCIENCE IN THE ELEMENTARY SCHOOL

Dr. Glenn H. Crumb

Here is what some of the KEMS project teachers are doing already this fall. Vera Molloy, Wichita fifth and sixth grade teacher says, "I used the attribute games before I even took out the Math book. I had to start right out with the development of the concept of sets, subsets and intersection with the games, one little girl said that she didn't know Math could be so much fun and so easy." Not being afraid to depart from the textbook is one thing but Mrs. Molloy also stated, "We made our own object and button collection. I didn't know so much math could be tied in with science until I found myself using it in every lesson. We sort the objects and the tray of objects becomes the universe set. We sort the objects into subsets with each subset having one property in common. Sometimes I give them the properties and sometimes they decide for themselves how they are going to sort them." A similar teacher innovation was described by first grade teacher, Pat Clair, Colby, who relates the following. "We placed several objects in the box then late one afternoon the children took turns reaching into the box an describing an object they felt. The other children then tried to guess what the object was. Later on I left the box out and encouraged them to bring objects for the box and place them in without anyone seeing what they put in. A couple of days later we again played our game with just as much fun as before. Later on I plan to use the box for math by placing say a set of 4 objects in the box, having someone count how many, then ask another child to place some objects in the sack, but not tell us how many. Then have another youngster count how many all together and see if we can guess how many the other pupil placed in the box $4 + ? = 9$."

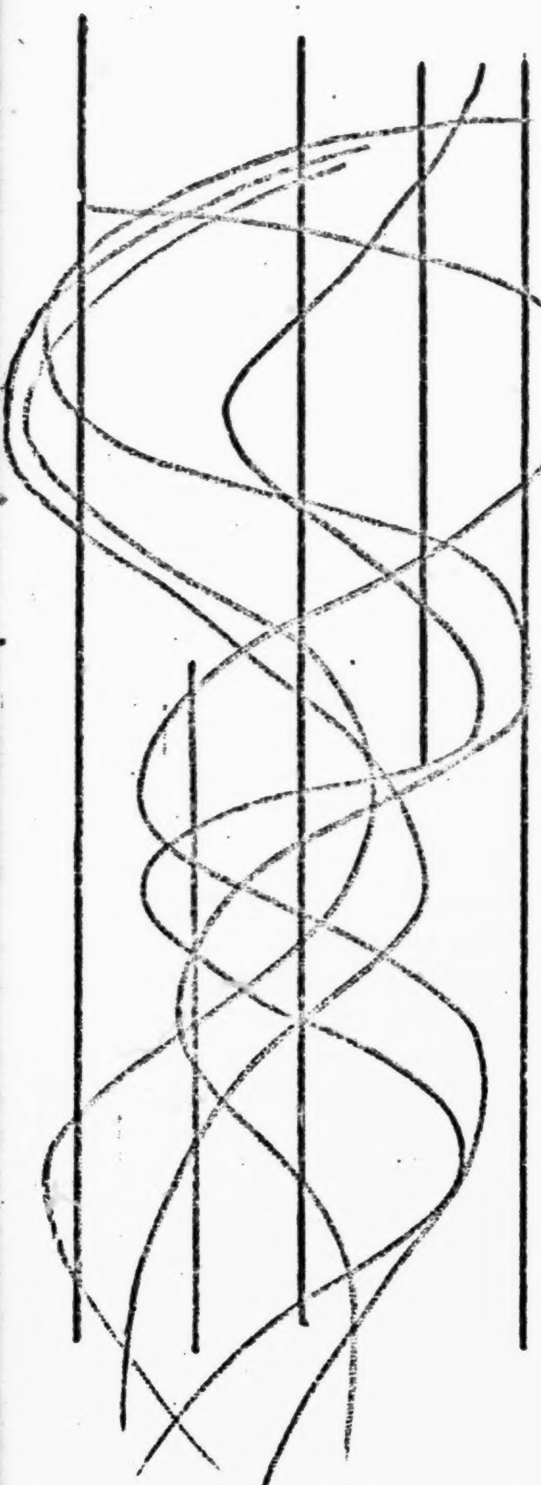
Children can also enter into discussion and use of rather basic mathematical tools as witnessed by this teacher's comments. "Today I began the introduction of prediction in the sixth grade classes. I had 16 buttons in each sack. When they emptied them on the tray I asked them to count them. In one group each child counted 16. I asked one girl how many she had and she said she had 16. I asked how many she thought each person should have in their sack and she said 16. When I asked her why? She said, 'because everyone in my group has 16.' I heard some disagreement from another group. I went over to see what was happening. One of the girls said, 'I have 15 in my sack.' Two more said they had 15. I said, 'how many do you think is in each sack?' She said 15. When I asked her why, she said, 'because I have 15 and the girl on my left has 15.' I asked her about the girl on the right. She had 16. 'Well, what did you think of that?' She said, 'Oh I just thought she made an error.' Then I asked them to check their sacks. They found their missing button. We then discussed the element of human error and why scientists must repeat the same experiment so many times before they could establish a belief as a fact. We also discussed having enough information to make an intelligent guess.

Next week I'm going to take some chocolate chip cookies to school and start record keeping, histograms, and the work prediction.

In one class after the students had emptied their objects in their tray, I asked them to count them. One student didn't have enough. I asked him to find out what was missing. In a very short time I saw him and his neighbor working. I asked the other students to observe what they were doing. They said they were matching their objects. I said yes and another name for it was one to one correspondence. This gave me an idea. I'm going to take an object out of several of the sacks and use this idea."

Anyone have any items of interest like the above?

"Are you all in a lather about your equipment? Don't feel bad so am I."



Here is an experiment to try!

FLAME LIFE EXPECTANCY

A candle needs air to burn; this fact is neatly shown by covering the candle with a jar. Further, the life of the flame varies when jars of assorted sizes and shapes are used. *Why does this happen?*

Have all the pupils bring jars, which should range in size from a quart to the smallest anyone can find. Then divide the class into groups, each having a birthday-cake candle standing in a lump of modeling clay on a smooth desk top. Appoint a "Candlekeeper" for each candle; he should be responsible for lighting it properly.

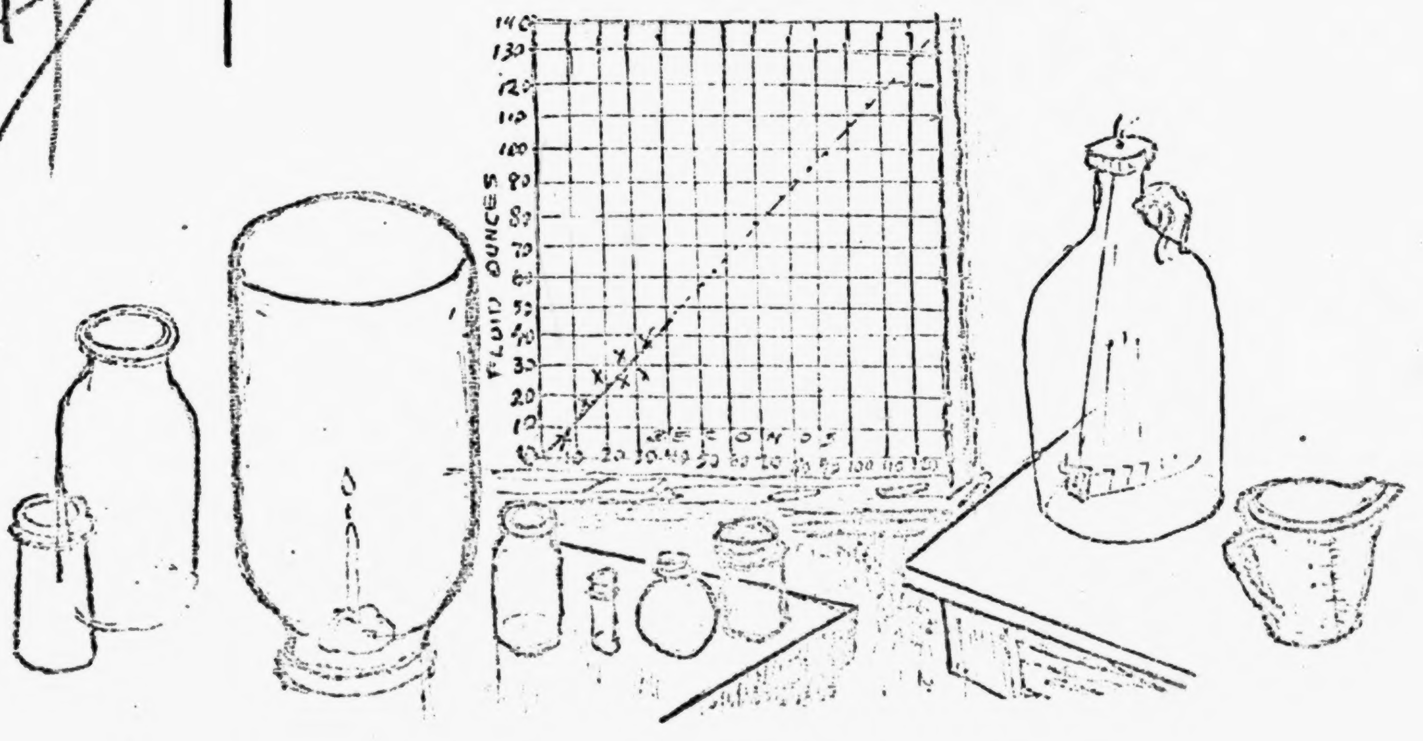
Caution: He should have a can of water at hand!

Also let one pupil serve as "Timekeeper" for the class. He is to say "Ready. Set. Go!" and at "Go!" release a "Swinging Second-timer" and count its swings aloud.

Now let each pupil, in turn, set his jar over the lighted candle at the word "Go!" *How long does it burn?* Have him record this. Then let him measure the volume of the jar by filling it with water from a measuring cup. Each pupil should repeat both measurements at least once, after fanning fresh air into the jar.

Rule a grid on the chalkboard, with evenly spaced vertical lines labeled in seconds, by 10's, from 0 to 120; and horizontal lines marked in fluid ounces, by 10's, up to 140. Then let the pupils make x's on the grid to indicate the volume of each jar and how long the candle burned in it. When all have done this, draw a smooth line through as many x's as possible, so that about as many of those it misses are on one side as on the other. This line shows the relation between the volume of air and the flame life.

According to this graph, how long should a candle flame "live" in a 2-quart jar? In a gallon jar? Extend the line until it crosses the lines that indicate the *measured* volumes of these jars. *Are these predictions confirmed by actual tests? If not, what other factors may be involved? How could one check to see?*



FREE
MATERIALS!

MODULAR FURNITURE LITERATURE

"Hey Gang"
The Science Center has some literature on Modular Furniture if anyone is interested please let me know.

ABOUT YOUR HEART AND YOUR BLOODSTREAM

This free leaflet contains a simple explanation of the heart and circulatory system for children in the upper elementary grades; 4 pages, illustrated. With each 25 leaflets, the teacher may order one copy of "Letter to the Classroom Teacher" which offers suggestions for using the leaflet. Single copies are available w/o charge from local heart associations or American Heart Association, Inc. For quantities, contact local heart assoc. or American Heart Association, INC.
44 East 23rd Street
New York, New York 10010

WHY THE LEAVES CHANGE THEIR COLOR

The Indians of early America believed that leaves changed their color because the celestial hunters had slain the Great Bear. Many people today suppose that Jack Frost is responsible for the color change. Neither supperstition is true. This fact sheet presents the true facts. Single copies are available to teachers from the U.S. Department of Agriculture, Forest Service, Washington, D.C. 20250

SCIENCE NOTE BOOK --"ALL ABOUT GROWTH"

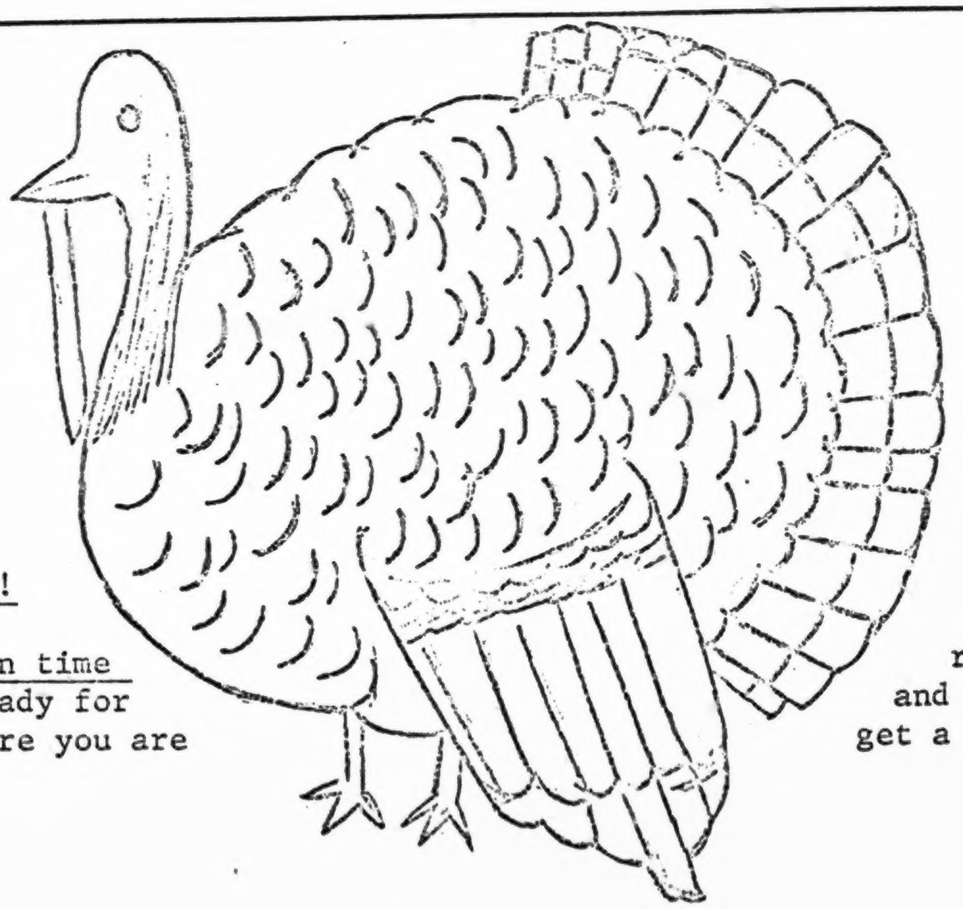
This is a science unit for intermediate grades relating to good nutrition. A reader includes simple science experiments. Single copy free to teachers. Available in classroom quantities for a slight charge. Continental Baking Company, Home Econ. Dept P.O. Box 731, Rye, New York 10580.

RAMONA J. ANSHUTZ
Science Center
K.S.T.C.
Emporia, Kansas 66801

KANSAS ELEMENTARY MATH SCIENCE

No. 3
November , 1968

Science Center
1427 Highland



Wheeeeeeeee!!!!

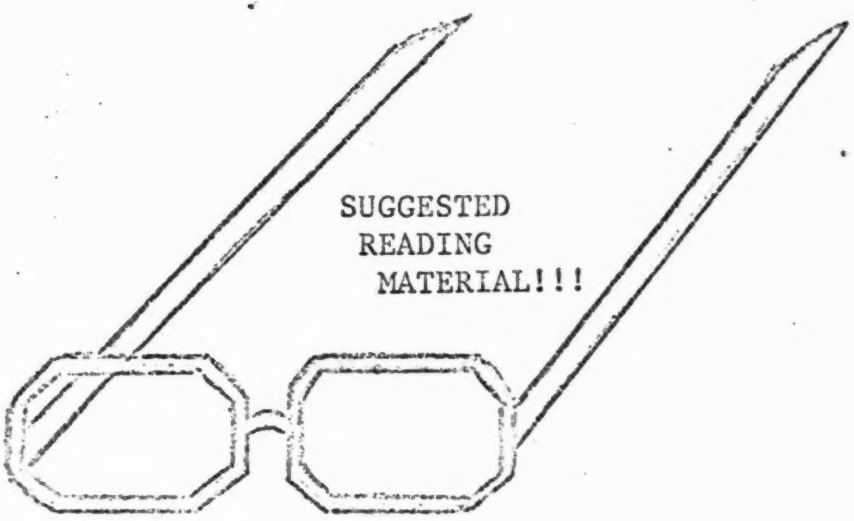
Almost vacation time are you all ready for it???? I'm sure you are ready for a break and a time to stop and get a breath.

"Did You Know?"

Any substance containing the element sodium produces a bright yellow flame. To show this, dip the end of a wooden stick in water and then in salt. Hold over a flame and note the yellow color when the salty tip kindles. Boric acid produces a green flame, while that of powdered copper nitrate is blue-green. Nitrates of strontium give off red color - potassium kindles reddish-purple flames (often masked by the presence of sodium or other impurities.

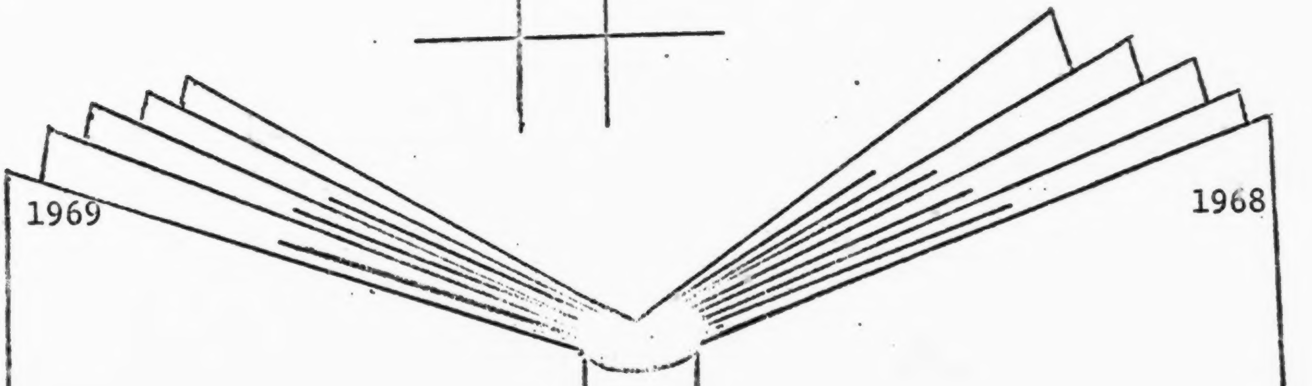
Your children may have already made candles from old candle ends or pariffin melted and poured into double paper cups or half-pint milk cartons to cool. Using the same method, add crystals of nitrates of copper, potassium, sodium or strontium while the wax is still warm. Use one kind per cup or container. When placed in a fireplace fire, these give off driftwood colors. Straining the wax before pouring makes for clearer colored flame.

Great idea for an experiment and Christmas gift at the same time !!!!!!!!!!!!!!!!



SUGGESTED
READING
MATERIAL!!!

The November issue of The Science Teacher has some GREAT!!! articles.



March 21-25, 1969
NSTA National Convention
Dallas, Texas

April 25-26, 1969
NSTA Silver Symposia,
Great Bend, Emporia,
and Kansas City, Kansas.

November 23, 1968
KEMS Meeting
Science Center at 9:00
1427 Highland, Emporia

Science Center will be closed the following dates:
Thanksgiving - Nov 28 thru Dec. 2.
Christmas - Dec. 20th thru Jan. 2nd 1969

"Thoughts About Creative Children"

By Glenn H. Crumb

A brief look back into the history of our nation and our society reveals that major advances in the arts, education, government, science and other areas have centered upon creative individuals. In our age, cultivation of creative potential as found in youth, is of utmost importance. As leaders in education you may be interested in some aspects of creativity reported in the publication Review of Research on Creativity by the Minnesota Research Coordinating Unit.

The research suggests that teachers can recognize creativity in children if they are aware of the variety of ways in which it is exhibited. This often requires a reassessment of the teacher's own values and concepts toward creativity. Some of the non-test indicators that help the teacher identify creative individuals are curiosity, originality, courageous behavior, non-conforming behavior (not bothered by pressure to conform) bent toward experimentation, unwillingness to give up, preoccupation with an idea and going beyond assigned tasks. Creative people tend to work at things that interest them and to have a casual concern for the things that do not interest them.

Some of the thought provoking suggestions in this research are:

1. Most research studies show that the correlation between creativity and IQ as measured by standardized tests is quite low. It is unfortunate that the tendency to link IQ and creativity is quite common. The individual thought to be hightly creative is also thought to have a high IQ, and the concept of giftedness is too often conceived in terms of IQ. Many highly creative persons do not have IQ's sufficiently high to be included in the gifted programs.

2. Teachers are not always comfortable with the creative students in a conventional classroom situation. Creative people often tend to be stubborn, temperamental and tenacious about their independent

thoughts. In general, creative students tended to be less popular with teachers than students with high intelligence but less creativity.

3. A most interesting trait of creative people is a sense of humor or playfulness. This trait has emerged in a variety of research studies as characteristic of creative students. The creative group is also characterized by great curiosity, the ability to ask penetrating questions and by showing more vivid imaginations with fantastic answers to certain questions they also tend to display at times, a considerable lack of control. These characteristics often lead teachers to view them generally as undesirable students.

4. Creative students often rebel against authoritarian teaching methods. There is some evidence that creativity can be fostered and developed through the use of problem solving techniques and independent study. The school is trapped in a dilemma between the need to provide mass education for all students and the need to permit exploration and experimentation for the individual.

The above findings may be related to some drop-out data from an Idaho study. This report stated that nearly 70% of the drop-outs listed reading or academic difficulty for dropping out of school. The study involved 10,686 pupil grade 1-8 and 2,047 pupils who dropped out in grades 7-12. Of the drop-outs:

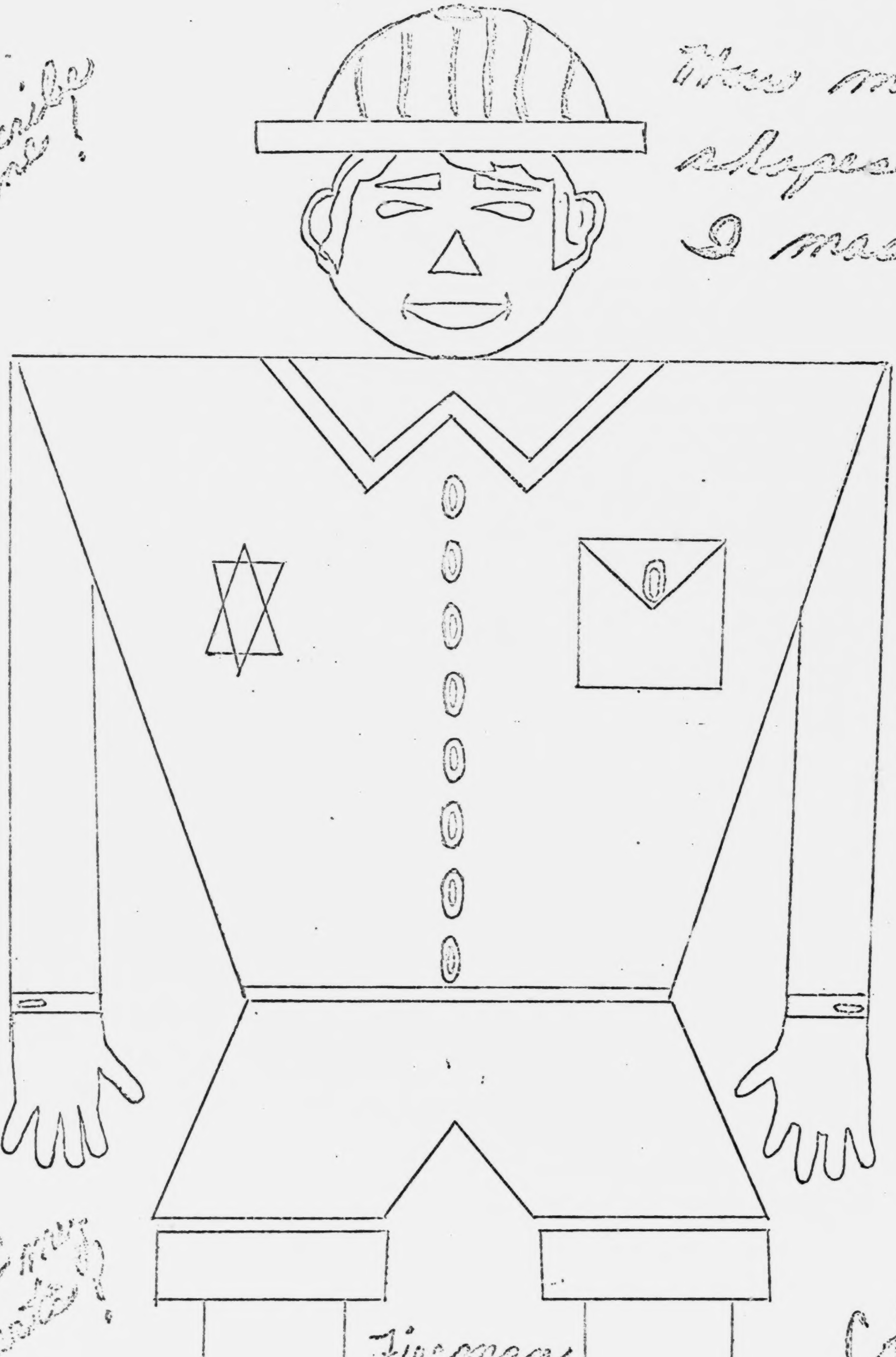
32% had poor attendance records
25% had academic problems
21% dropped because of pregnancy or marriage
17% had been retained in one grade for two or more years
29% were at least one year below the reading level for their age

Sixty-seven per cent of the drop-outs had IQ's between 90 and 115, 10% had IQ's of 115 or above. The largest percentage of drop-outs were from the 17 year age group and the eleventh grade. The number of years that the student had spent in the school did not appear to be related to the probability of dropping out.

As keen observers of pupil behavior and teachers who use a great deal of pupil activity you may be in an enviable position to promote creativity in the children with whom you work. Can you identify the potential Einstein, Bach, Lincoln, or Churchill in your class?

Describe me!

How many shapes am I made of?



Count my parts!

Color me!

ELEMENTARY SCIENCES

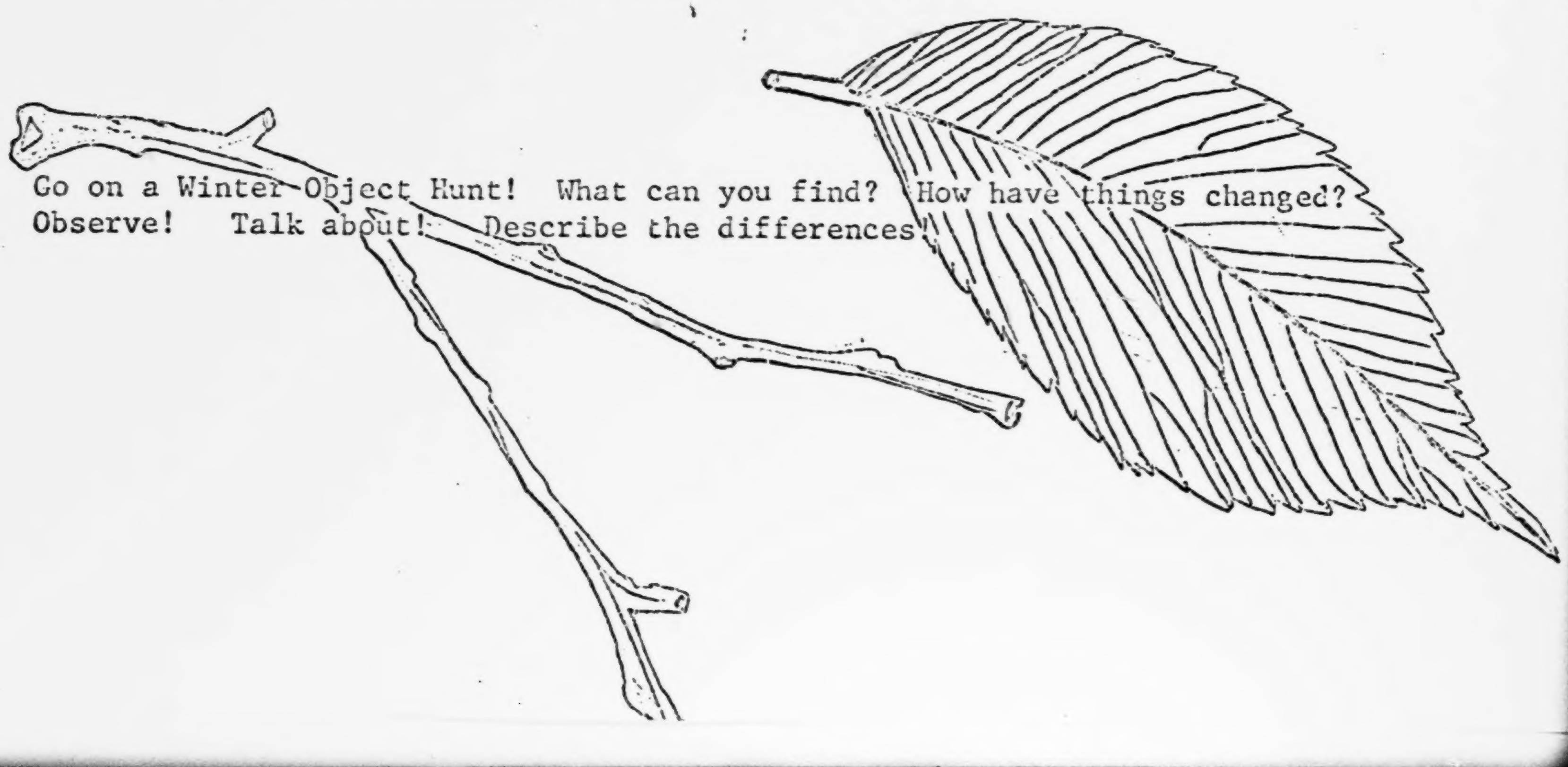
New Year's Resolutions: Teachers Style

Warren Darling

Grievances arise from faulty communication. The teacher of the elementary school child is certainly actively involved in developing the skills of communication. The science activities that take place in your classroom afford an opportunity for children to practice the art of communication. The teacher should require clarity of expression whether the child is asking the simplest "What?" question or giving a complex "How?" explanation. Insist that work that has not been done as well as the child can perform be redone. Most people hate to do work over but children must learn early in life that there are some things they are going to have to do whether they want to or not. Those that have learned this at home are no problem to you and you may thank their parents for their foresight. But those who do not learn to do unpleasant tasks willingly are the children most likely to grow up to be a burden on society. If you do not set up realistic requirements and insist that they be met, regardless of how much extra work it makes for you, these may be the very children who never have a chance to learn this hard and important lesson. Remember: Rioters are people who want to do as they please. They may be your pupils who never learned to communicate except by refusal.

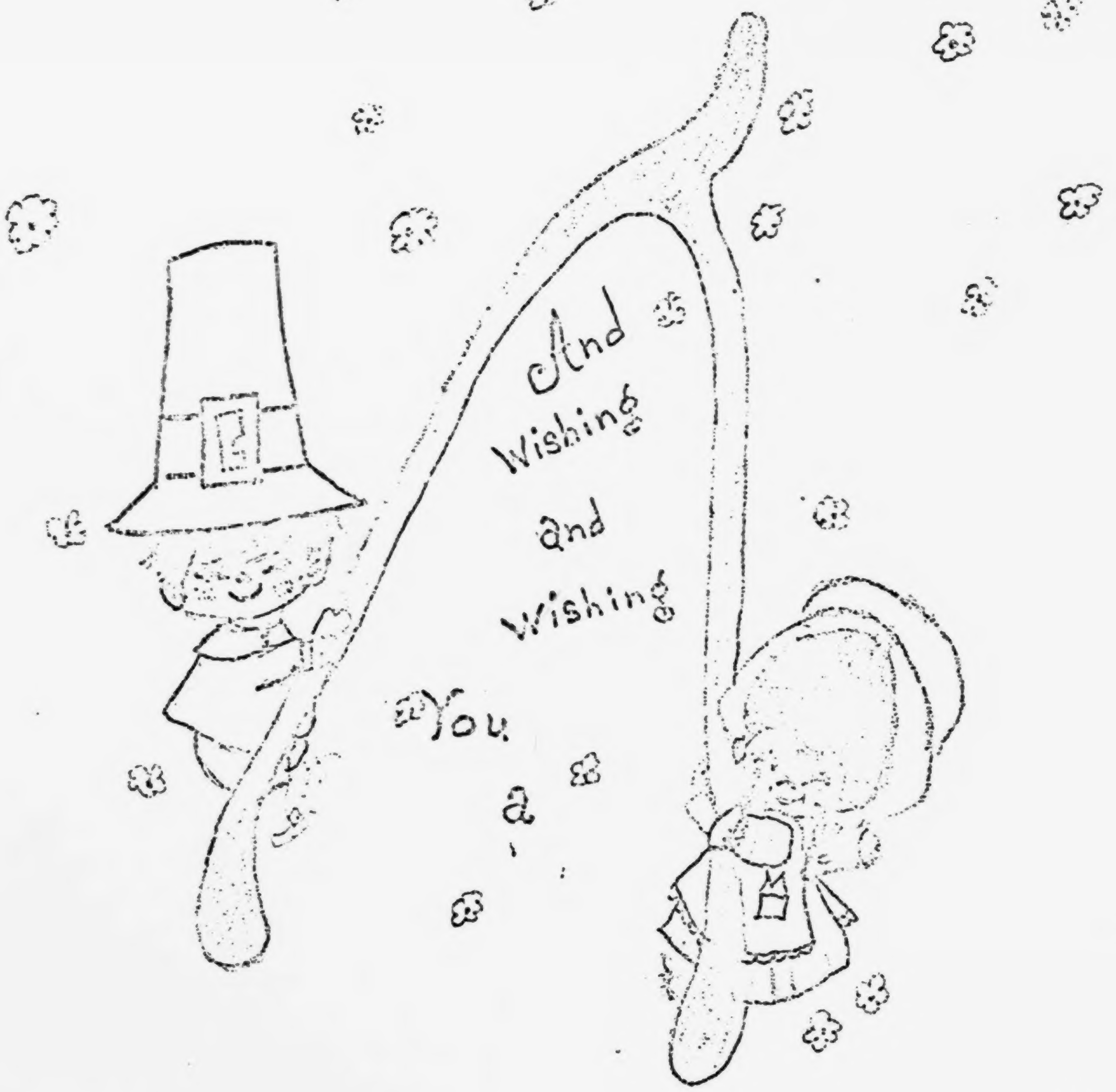
The kinds of observational activities in a science lesson which lead to conclusion drawing require other skills which must be developed in school if they are to be used later in life. With these skills the next group of young adults will be likely to look for different viewpoints weigh their decisions on reason rather than on emotion or prejudice. The science lesson can be a key factor in turning out responsible citizens. These people will naturally turn to orderly means for settling their grievances.

Science hobbies are one of the popular methods of using leisure time. Many so-called grievances are merely the brain-children of professional agitators who gain their own ends by finding "mischief for idle hands to do." A child may pick up rocks for his mineral collection or to throw through a schoolhouse window. It is virtually impossible for him to use the rocks both ways. May we hope that all science hobbies will help to become contributing members of society instead of riot fodder.



Go on a Winter Object Hunt! What can you find? How have things changed?
Observe! Talk about! Describe the differences!

Just wishing...



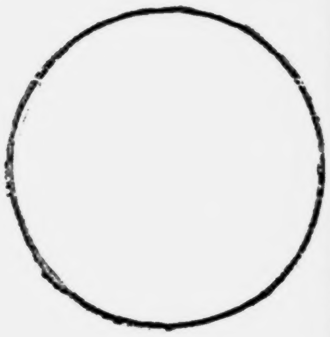
And Wishing and Wishing You a

Happy Thanksgiving!

KANSAS ELEMENTARY MATH SCIENCE

NO. 4 Science Center
December, 1968 1427 Highland

ESTIMATE



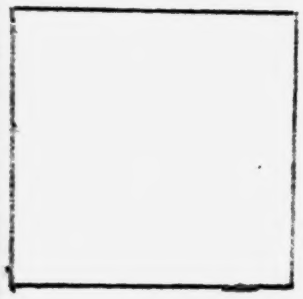
Estimate the number of books you will need to cover the top of a table, so that the books do not over lap. Then fit the books on the table top to cover it.

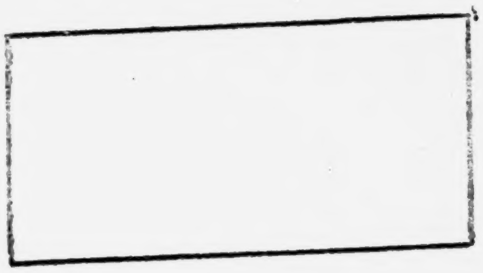
How many did you use? How near was your estimate? Do this activity with many different things example -- sheets of paper, postage stamps, erasers (chalk board) and etc.

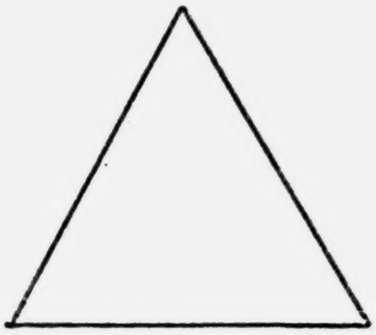
Provide sets of geometrical shapes, squares, retangles, regular triangles, regular hexagons, regular pentagons and circles. These should all be the same size (provide several of each shape).

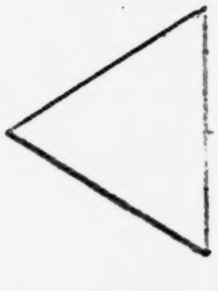
Take all the triangles. Estimate how many you will have to use to cover the front of the large reading book. Then use the triangles to cover your book. How many did you use? Was your estimate too big or too small? This can be repeated with the other shapes.

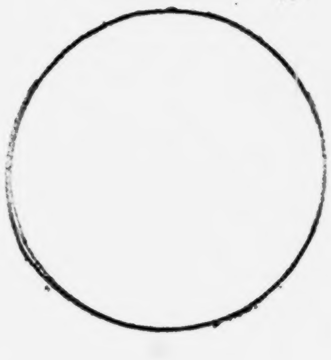
With which of these shapes did you find you could cover a surface? Which were not very good for this purpose? Write about this in your own way.

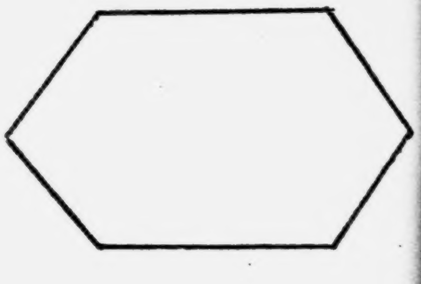












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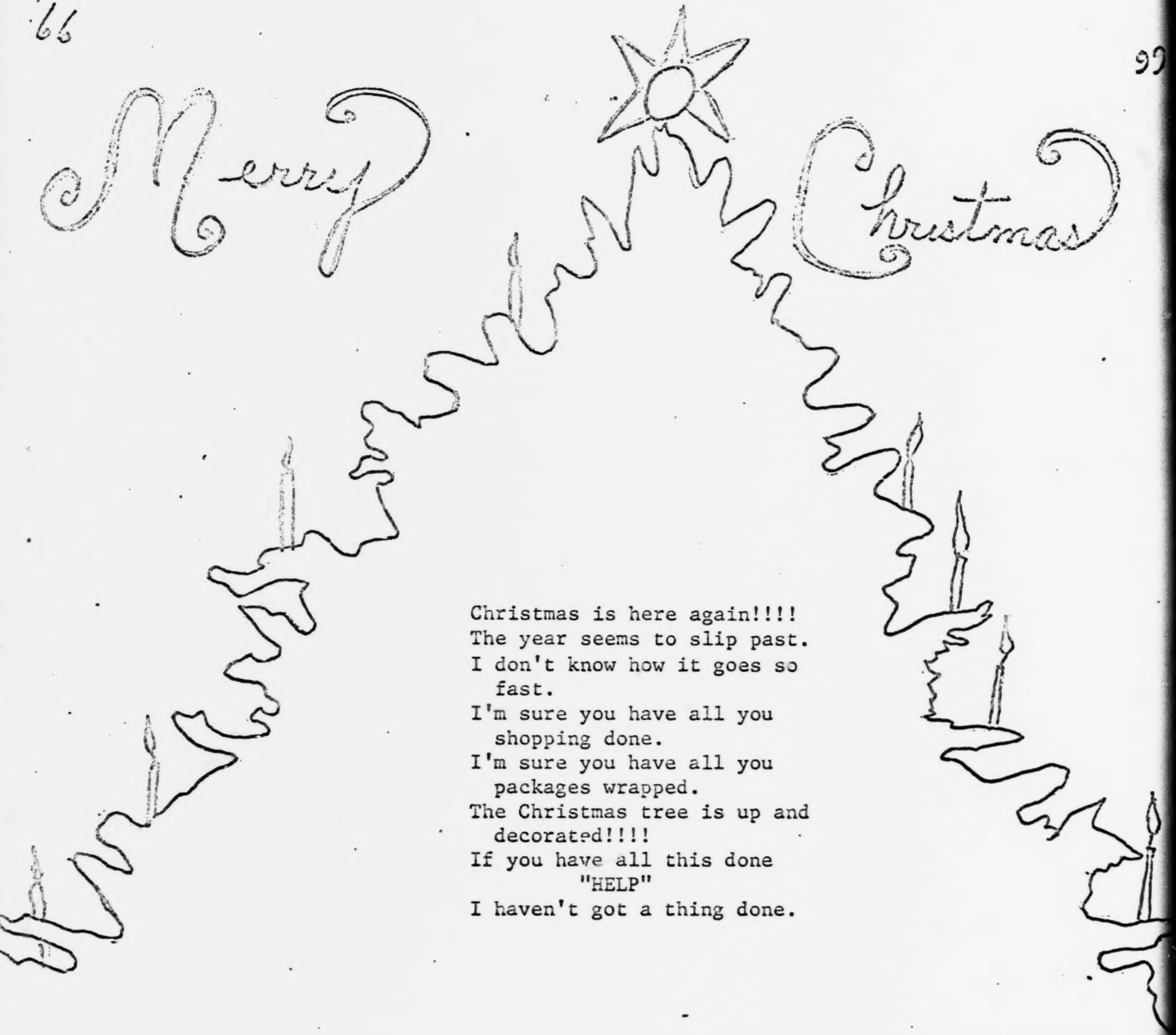
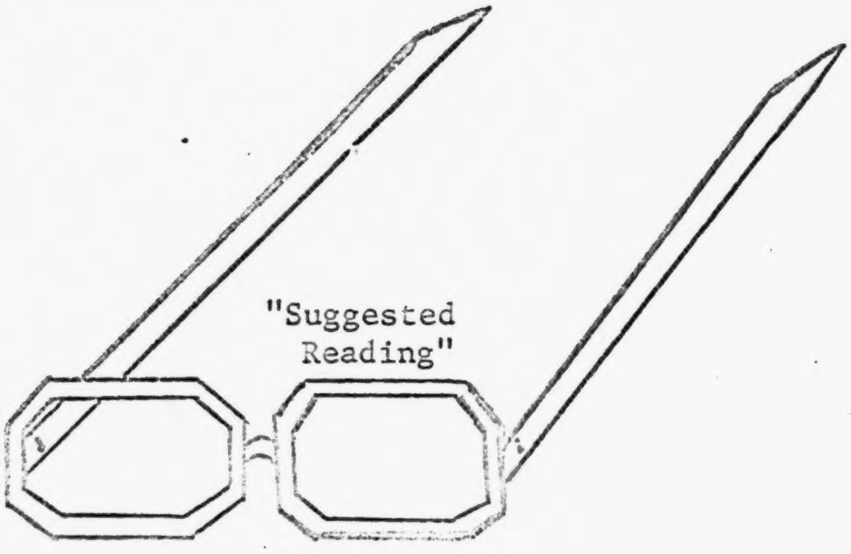


Christmas is here again!!!!
The year seems to slip past.
I don't know how it goes so
  fast.
I'm sure you have all you
  shopping done.
I'm sure you have all you
  packages wrapped.
The Christmas tree is up and
  decorated!!!!
If you have all this done
        "HELP"
I haven't got a thing done.

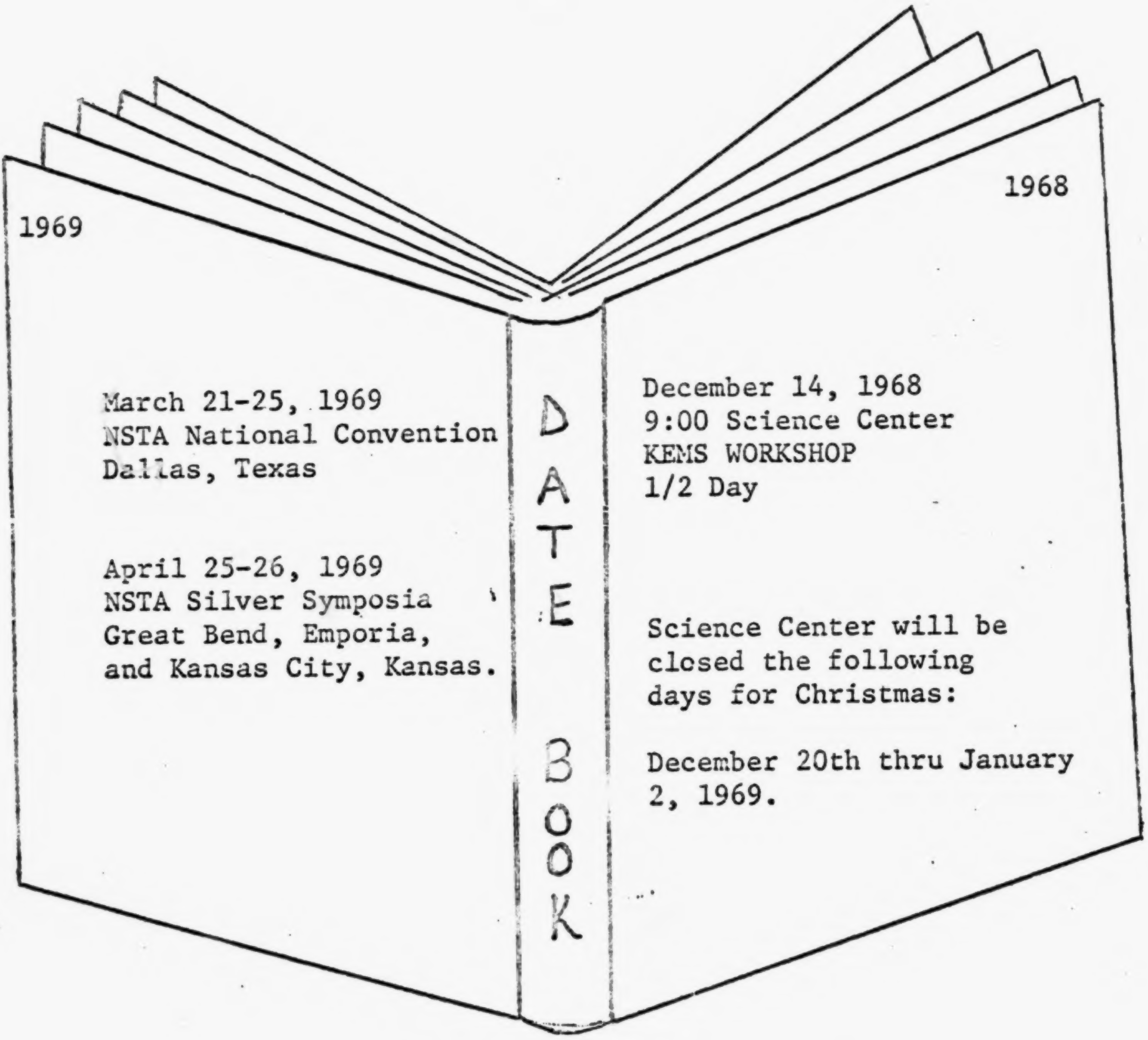
I would like to take this opportunity to wish all of you a very Merry Christmas and a Happy New Year.

Ramona L Anshutz



"Suggested Reading"

Elementary Teacher's Classroom Science - Demonstrations and Activities by David E. Hennessy - Prentice-Hall Inc. Englewood Cliffs, New Jersey.



1969

March 21-25, 1969
NSTA National Convention
Dallas, Texas

April 25-26, 1969
NSTA Silver Symposia
Great Bend, Emporia,
and Kansas City, Kansas.

1968

December 14, 1968
9:00 Science Center
KEMS WORKSHOP
1/2 Day

Science Center will be closed the following days for Christmas:

December 20th thru January 2, 1969.

"TALK CAN HURT!"

by Walter Scott Houston

The best teaching I may ever have done was during the two weeks I lost my voice.

This seems like a contradiction. Isn't it said that a teacher earns his living by talking? The general image of a teacher is a pedagogue standing in front of a class - and talking.

TEACHER'S DILEMMA

As luck would have it, I lost my voice in the middle of a long explanation. To stop there would be to lose all I had poured into the problem, and even worse, to lose what partial concentration I had so far wheedled from the class. Obviously, it was imperative to go on- but how?

I did have a blackboard, which I think is the best visual aid yet devised. The students all had texts.

Backing up a concept or two, I started through the explanation again with a combination of words and phrases hurriedly printed on the board. To these I added sign language and pantomime.

IT WORKED

The results were pleasant. My voice took two full weeks to come back. In that time I wrote phrases, made signs, pointed at students to read key sentences from the text. I had to stay away from writing full sentences or paragraphs. Anything more than four or five words, and I began to lose their attention.

The novelty of the situation increased class attention at first. As the days went on, with the class having to do all the talking, with my part a mere nod, shrug, or a word on the board, students' concentration increased. I had never before seen them so serious and so intent.

This unintentional teaching technique must have been effective. For one unit examination, the class scored 14 percentage points above its normal level.

TEACHER-TALK STUDY

This was many years ago, but it all came back vividly when I came across Dr. William D. Floyd"s study on the ratio of teacher talk to student talk in classrooms. Dr. Floyd, Associate Professor of Education, Central Washington State College, Ellensburg, Washington, taped hour and all-day class sessions. Then he counted the time apportioned to students and to teachers. The results tell us something. (Continued next page.)

The teachers spoke over 70% of the words. If the class consisted of 30 students, that means each student supplied 1% of the total talk.

Is this participation?

If you merely focus on the questions, then the teachers asked an average of 96.4% of the questions. Is this the way a "discovery-oriented" curriculum should work?

The majority of teacher questions dealt with memory. Over 85% of the teacher questions did nothing to stimulate inquiry or creativity.

TRY THIS EXPERIMENT

It might be enlightening to teach silently for an hour as an experiment. Tell the class you are not going to talk at all. Tell them a yes-no nod, or no more than four words on the blackboard will be the extent of your powers. Tell them they will have to carry the ball. You might be gratified.

Here is an idea!!!!

What can you do with this??

? !

PREDICTING

counting --1, 2, 3, 4, 5

Terms: Vertical Horizontal Top, middle, bottom, left, right and center.	How many dots can be placed in this square? How can you find out the size of each block? How could you find out how large the whole square is?
Predicting - Where will the dot be if you turn it: upside down, sideways and etc.	How many little squares in a a large one? Now see what you can do with this and let me know.

OBSERVING

↕ measureing

Observations Lead to Questions in Science

What kinds of science questions do students ask? Will they lead to practical and fruitful student investigations?

The professional scientist walks into his laboratory with one basic thing—a question on his mind. He wants to find out something about something. Likewise, your students should begin the study of a science unit with some meaningful questions that they have posed. A good science question that is understood by the student is one that will guide learning activity.

How do you get students to formulate meaningful questions?

Role of Observation

Observation plays a great part in all scientific work. It is important for the student to first make some basic observations about a subject. Questions will naturally follow these observations Such questions are often more meaningful to the student than those put to him by some outside source.

Getting Started

A unit of study can be started with a period of observation. Each student should have a subject to observe, and should be challenged to list on a piece of paper as many observations as he can about the subject. Each student should work independently. The object could be a seed, a leaf, a housefly, a rock, a fish in an aquarium, a burning candle, or any other object you might choose. Undoubtedly, your students will include interpretations in their lists. To separate observations from interpretations, be sure that each entry on the list of observations is something that is known through the senses.

Write Questions

After the observation period, students should be assigned to write out questions based on their observations. You should then guide the students in learning activities that will help them answer the most important and interesting questions selected.

There are, of course, many things and phenomena that can be observed in the classroom setting. Once all the senses have been used to make observations, instruments can be used to gather additional information. The hand magnifying lens is one of these tools, and so is the microscope.

Three separate class periods of observing the common housefly-for example, first with the unaided eye, next with a hand lens, and third with a microscope-will allow additional and more sophisticated observations at each period.

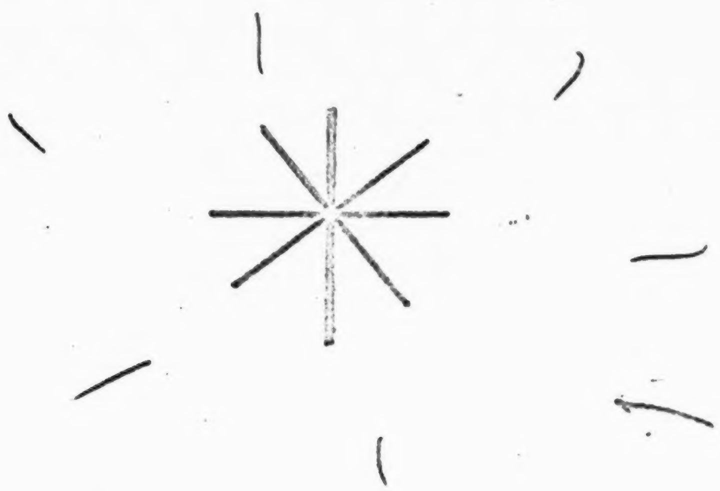
Appropriate and worthwhile science questions usually come from making many observations of things in the environment. Good science questions become the starting point for "sciencing."

Planets, October 1968 - June 1969
Abrams Planetarium, Michigan State University

Venus will be visible as a brilliant evening star in the western sky during the early evening from August 1968 until early April, 1969. It will set 2 or more hours after the sun from early November 1968 to late March 1969. If one observes each night one half hour after sunset, Venus will rapidly get lower in the western sky during March and early April. Venus will be difficult to observe for a few days around April 8th, when it will pass nearly between the earth and the sun, but within a week after that date Venus will be easily visible low in the east about half an hour before sunrise. By mid-June Venus will rise 2 1/2 hours before the sun. Venus will remain visible as a morning star until until mid-December 1969.

The cresent phase of Venus will be easily detectable in 7x binoculars during March 1969 and again in mid-April through mid-May. Look while the sky is brightly illuminated during twilight or in the daytime and hold the binoculars very steady.

The apparent motion of Venus in relation to background stars may be easily noticed within a few days from late October 1968 to late March 1969; throughout this period Venus will be visible against a dark sky background. Have students watch for Venus' motion with respect to background stars and record their observations on a star map. Brightest objects appearing near Venus will be: Antares, late October 1968; Saturn, late February through March 1969, and again in June 1969. This article will be continued in the January Newsletter.



KANSAS ELEMENTARY MATH SCIENCE

No. 5
January, 1969

Science Center
1427 Highland St.

Teaching Science In The Elementary School

by Harper & Row

The Elements of Discovery

When the child is helped to discover generalizations rather than having adult generalizations imposed upon him, he is developing his rational powers, gaining an understanding of content, and learning how to learn.

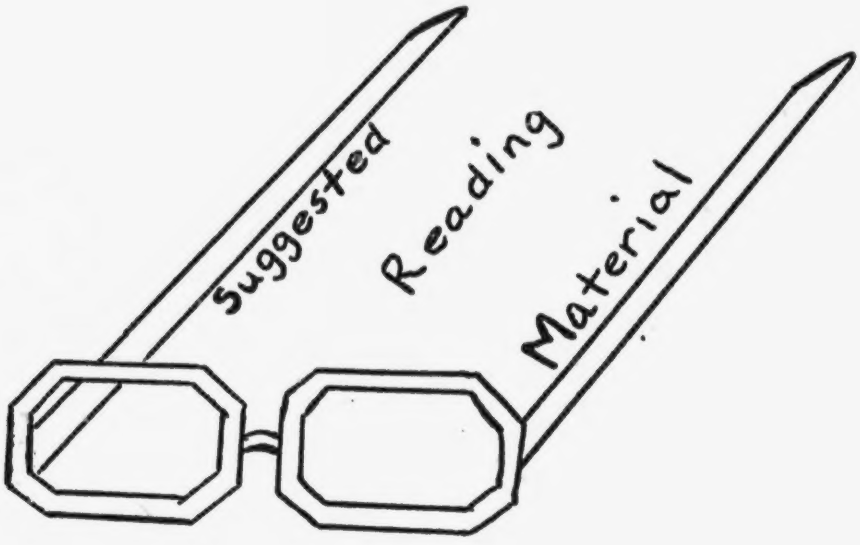
Authoritarian teaching consists of imposing upon the pupils the generalizations which adults think he should know; the discovery approach allows pupils to collect, classify, and interpret data to arrive at generalizations which are truly their own.

The act of discovery is not restricted to finding out something that was previously unknown to anyone; rather, it includes all forms of obtaining knowledge or insight for oneself by the use of one's own mental powers.

Children who learn science by the discovery approach will discover for themselves the true structure of the discipline.

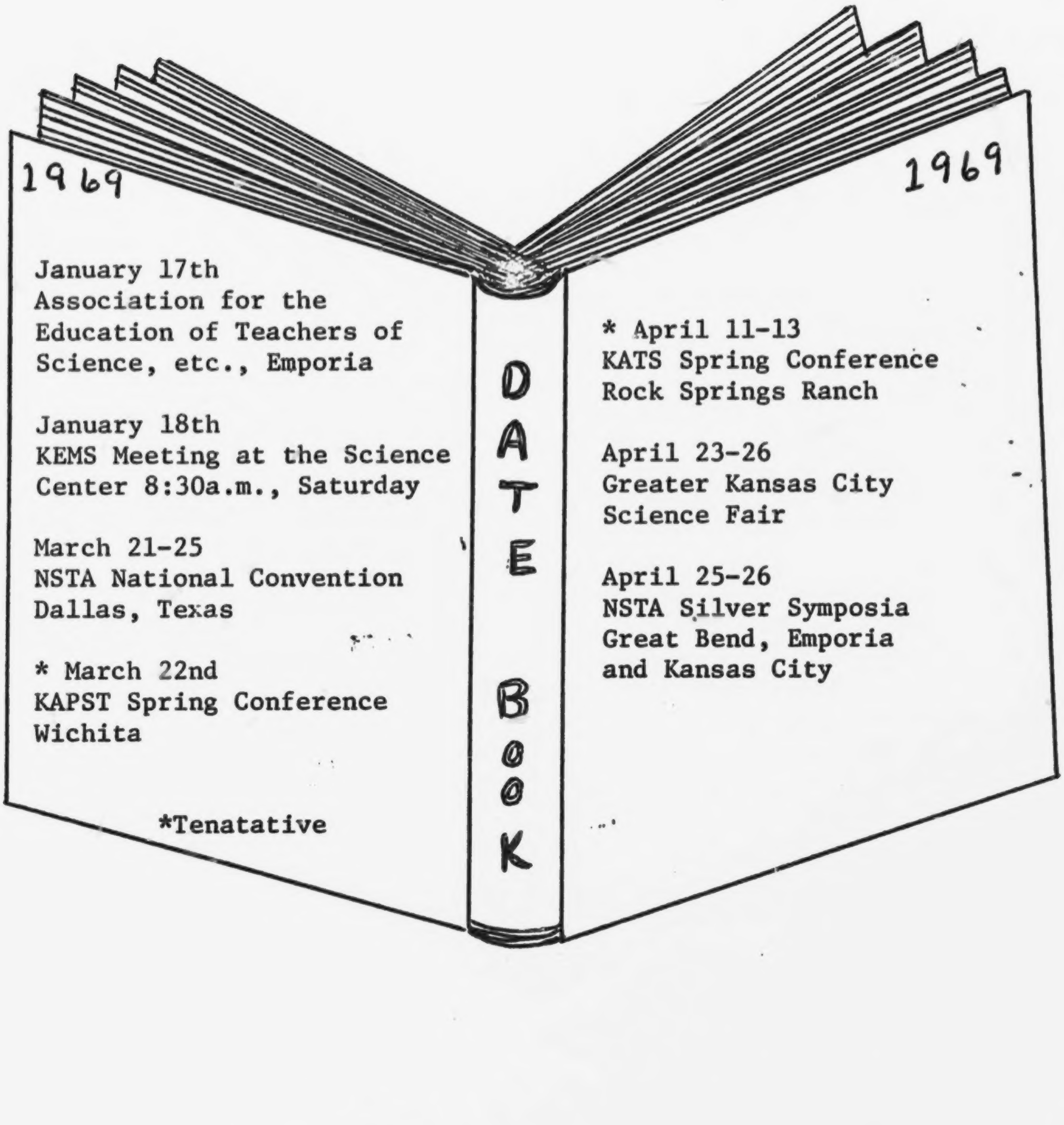
Motivation for learning science must come from an intrinsic need for dealing with the environment, rather than from rewards and punishments, if it is to be effective.

"Invention" refers to the original introduction of a new concept; "discovery" refers to the subsequent recognition of the concept's usefulness. Both processes have a place in the elementary-school science program.



Judgement & Reasoning in the Child
by Jean Piaget
New York Humanities Press 1952; 1st Ed.-1924

The Origins of Intelligence in Children
by Jean Piaget
New York International University Press 1952; 1st Ed.-1936



January 17th
Association for the
Education of Teachers of
Science, etc., Emporia

January 18th
KEMS Meeting at the Science
Center 8:30a.m., Saturday

March 21-25
NSTA National Convention
Dallas, Texas

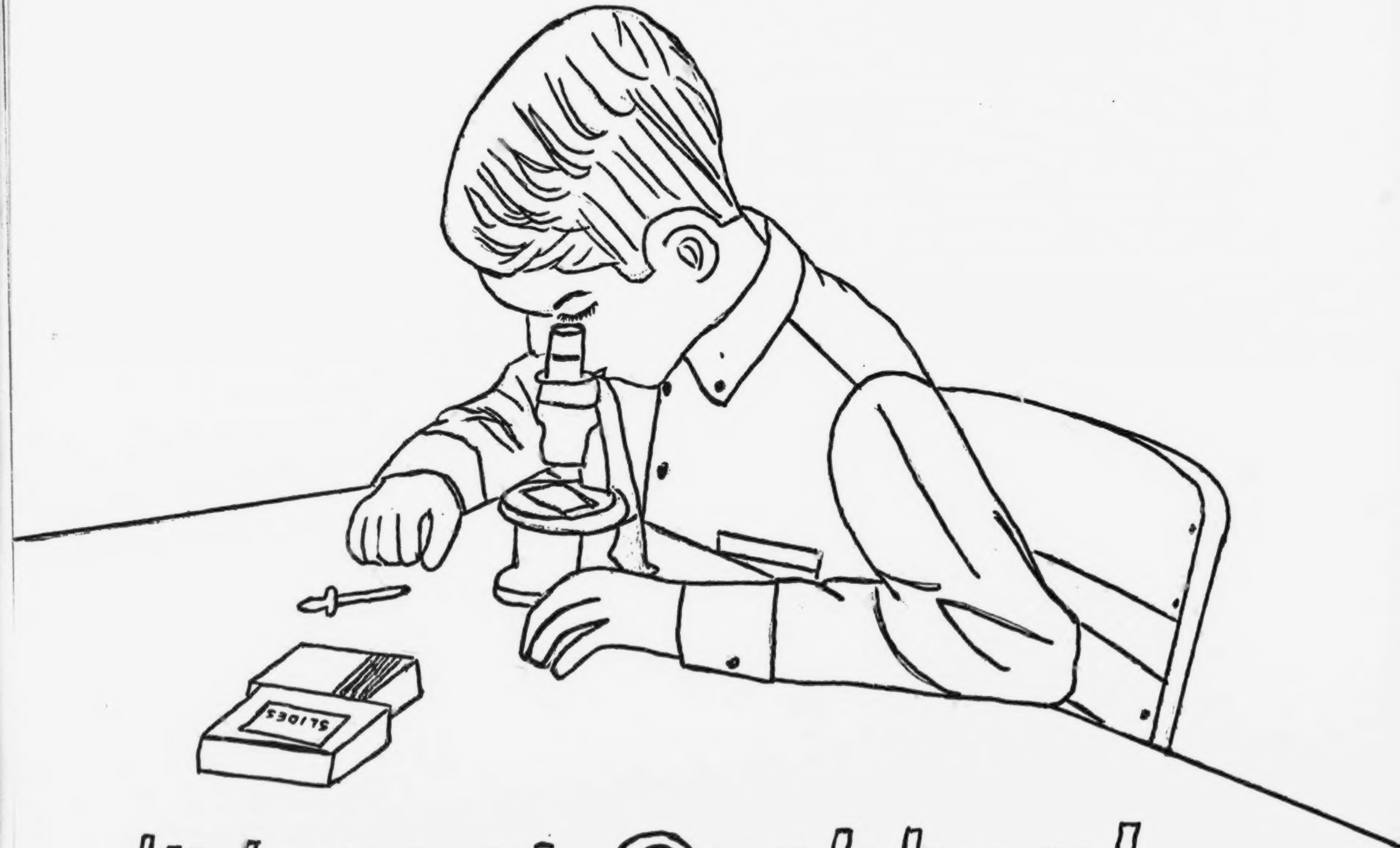
* March 22nd
KAPST Spring Conference
Wichita

*Tenatative

* April 11-13
KATS Spring Conference
Rock Springs Ranch

April 23-26
Greater Kansas City
Science Fair

April 25-26
NSTA Silver Symposia
Great Bend, Emporia
and Kansas City



Interest Grabber!

Give a youngster a microscope simple enough for him to use, get him to yank a hair from his own head and see what it really looks like; or some dust; or a leaf he's found. From that moment he will never lose interest in the tiny things in his world. Worth trying!!
Write Bausch & Lomb, 83112 Bausch Street, Rochester, New York 14602 for Catalog 31-1121 on Elementary Microscopes. Prices start as low as low as $12.00.

(Continued from December Newsletter)

Planets, October 1968 - June 1969
Abrams Planetarium, Michigan State University

Mercury has a fairly good appearance as an evening star very low in the SW sky about 45 minutes after sunset from about December 29, 1968 through January 14, 1969. Look very low in nearly the same direction as the sun sets. Binoculars will be helpful to locate it. Around December 29, a line from Deneb to Altair extended points to Mercury. Around January 9, a line from Vega to Altair extended points to Mercury.

In 1969 Mercury will be best visible as an evening star very low in the WNW sky about 45 minutes after sunset from about April 18 to May 8, and is best near the middle of that period. Do not confuse Mercury with Aldebaran, which until the end of April will be higher and to the left of Mercury, and Betelgeuse, still higher and even more to the left. Around April 25, a line from Betelgeuse to Aldebaran if extended, will point to Mercury. Around 29 the Pleiades may be noted with binoculars close to Mercury.

IMPORTANT NOTICE FROM THE DIRECTOR

Dr. Forrest Coltharp will make a presentation at the KEMS meeting on Saturday, January 18.

This will be a full day meeting. Please plan to spend most of the day in Emporia as it will be necessary to enroll for credit. You may report to KEMS Center starting at 8:30 a.m. to carry out your enrollment procedures. Futher information about this meeting will be available at the Center upon your arrival.

Dr. Coltharp will make a morning presentation. A Line Luncheon (Dutch) is scheduled for noon. In the afternoon we will have presentations on both Math and Science. You will be dismissed at approximately 3:00 p.m.

If you have materials checked out that you wish to exchange for others at KEMS Center please bring them with you. KEMS personnel in Wichita area are issued a special invitation to attend these sessions.

Slightly Satanical

Tips for Teachers

by Howard A. Ozmon, Jr.

No book on law says that the young lawyer should not be seen in Argyle socks. Yet knowing this seemingly trivial rule can save clients, particularly rich and staid ones.

Likewise, in education there are small bits of truth not contained in ponderous textbooks. Here are some home truths that can make the difference between success and failure in every year.

1. Don't hesitate to beat your children

Beat them, that is, to possible sources of information in your community. Don't let the children stump you by talking about places you haven't been. Don't let them bring up books you haven't read. Walk around the community, stopping often in the library.

2. Teach them to beg

In eighteenth century Europe, children were sometimes taught by professionals how to beg for food and money. Some were so successful that they and their teachers became rich. But the begging I refer to is for information. If as teachers we can instill in our pupils the desire to beg for more and more knowledge, never relying upon piled-up stores, never reaching satiety, then we have served them well.

3. Teach them to hate

We all know our pupils should hate sin, but there are other things worth hating, too. They should be taught to hate ignorance; not ignorant men, but the miasma of ignorance that blinds them. They should hate calumny, hypocrisy, envy, and selfishness. If they hate these things strongly enough, they will do something about them, which is our next point.

4. Teach them to fight

Children must learn to fight for the things they believe in. One of the great lacks in our time is moral courage. Young people are often afraid to stand up and fight. We can't teach courage as we teach mathematics, but by precept and example we can inspire pupils to take the right road, not merely the easy road.

Continued -- Tips for Teachers

5. Teach them to talk back

One of the first rules the average child learns is that he should be seen and not heard. But a child who is not heard does not learn. He must ask questions. A teacher should impress upon children the importance of asking intelligent questions and with relating answers to other things they have learned. Done in the right manner, talking back is fine.

6. Teach them to show off

Every child likes attention, and it should be given him. When a child is shown how to communicate his knowledge and demonstrate his talents in a pleasing way, he learns how to serve others and make friends. He becomes an asset to society.

If these rules don't fit what you learned from your textbooks, think awhile. Maybe the textbooks were wrong.

Get yours now!!
Several copies of "Planning for Effective Science Teaching" by Thomas Aylesworth have arrived. They will be at the KEMS Center and anyone who wishes a copy may pick it up after Jan. 2nd.

Ramona J. Anshutz
Science Center
K.S.T.C.
Emporia, Kansas 66801

KANSAS ELEMENTARY MATH SCIENCE

6 #

Science Center
1427 Highland

February, 1969

F
E
B.
Valentines
Day
14th

Now is the time to start looking for workshops for elementary teachers for summer of '69. Don't be afraid to inquire, go out of state. Be flexible, but hold off final commitment until mid April.

George
Washingtons
Birthday

February 22, 1968

ARE YOU GUILTY?

By John H. Griffith

1. Are you guilty of going on a picture drunk? Have you been guilty of showing several complete filmstrips, sets of 2x2 slides, or several moving pictures all at one time?

2. Are you guilty of failing to prepare the student for that which you want him to see or understand?

3. Are you guilty of expecting a student to understand a picture, film, or diagram just because he looks at it? (A picture is not necessarily worth a thousand words.)

4. Are you guilty of failing to follow up the use of each aid with an explanation of points not understood and a check on what has been learned?

5. Are you guilty of failing to place the new vocabulary to be encountered in the film on the board?

6. Are you guilty of failing to ask unanswered questions about what is to be seen in order that the student will be alert in finding the answers to those questions?

7. Are you guilty of thinking, that because a certain film is good, the whole school ought to see it whether it fits into their unit of work or not?

8. Are you guilty of thinking that a film which lasts only 10 minutes is a waste of time? (Attention span of many children is not longer than this.)

9. Are you guilty of thinking, "I won't have to teach today because we are going to have a film"?

10. Are you guilty of failing to realize that many of the words you use are empty, meaningless words to your students and that they will continue to be so unless you are able to put meat on these word skeletons in the form of real and vicarious experiences?

ATTENTION ATTENTION ATTENTION ATTENTION

ATTENTION ATTENTION ATTENTION ATTENTION

Free!! Material

The KEMS Center has recently received two film strips and two audio tapes on science and cancer. These materials would be useful for upper grade children, high school and adult use. It might be that they would be useful for PTA Groups. One title is "What Science Knows About Cancer" and the other title is "Aberrent Cells - The Nature of Cancer". These two titles have film strips, audio tapes and a brief descriptive booklet accompanying them.

These materials are available from the KEMS Center upon request at no charge.

Science

Cancer

Planning For Effective Science Teaching

Chapter 9 - On Knowing Students

by Thomas G. Aylesworth

Our classes are filled with many types of students. We have some who know a great deal of science and some who don't. We have some who like science and some who don't. We have some who like biological science and dislike physical science, and some whose interests are the reverse. How can we judge them with the same set of measuring instruments?

It is possible that the student in our class who entered with no prior understandings of science may have learned twice as much as the student who knew some science when the class started. It is also possible that he will never catch up with the rest of the group during the time he is in our class. Will we penalize him with an average grade that does not reflect how much he learned? Not if we believe in self-competition.

Of course we cannot reward the poor student with a high grade just because he worked hard and caused no trouble. On the other hand, we cannot penalize him merely because he started the year so far behind the rest of the class.

Judging students on their work in competition with others may be proper in the fields of vocational education. That is, we are not interested in how well a physician or teacher improved during his professional education, but rather on how competent he is when he is ready to practice. On the other hand, science is general education, and we cannot hope to have all students end a course with the same degree of competence. We must bring them along as far as we can, depending on where they started.

We need to know our students in order to judge the degree of self-competition that they exhibit. We need to know the point from which they are starting.

There are several items concerning home life that might be of significance in controlling the adaptability of the student in the science classroom. Another factor is the socio-economic group to which the family belongs. The students relationships in the community should be known. The background of the studnet's personal preferences is a vitalfactor in his propensity toward science, also. Another question that should ve asked is his vocational choices. Still another factor is the extracurricular or cocurricular life of the student.

Continued on next page---

Continued---

There are several other things about the student's personal lives that we probably should know.

As a last item in this student inventory, the scores of standardized tests should be mentioned. These give us an indication of the students' preferences, abilities in intellectual pursuits and abilities in manual dexterity.

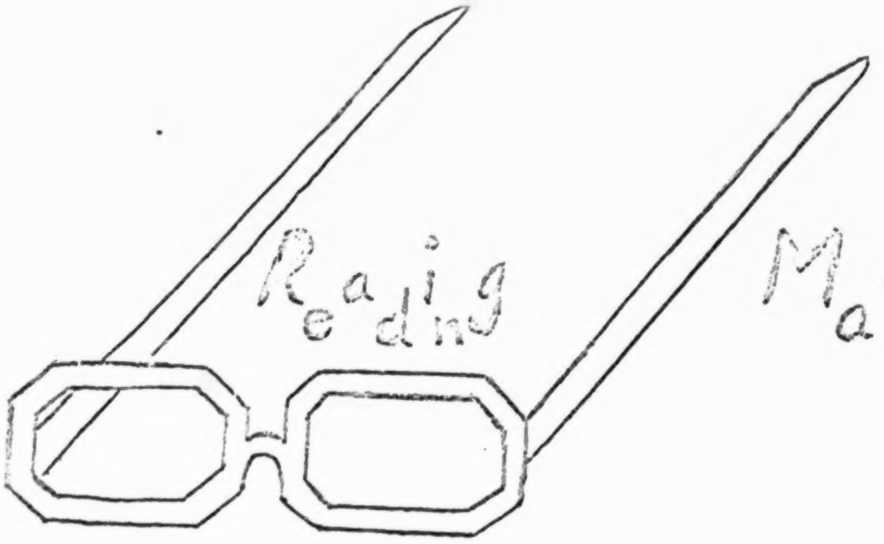
All of these items of information, insofar as possible, should be a part of our preliminary judgment of our students. Not only because we need to know their backgrounds before we can teach them or even know where to start to teach them, but also because we cannot know whether we are demanding too much or too little from an individual unless we know as much as possible about that individual.

Planets, October 1968 - June 1969 Abrams Planetarium, Michigan State University

Saturn will be visible as an evening star from October 1968 through late March 1969. Saturn is not as bright as Venus or Jupiter, but its brightness is still considerable, being equivalent to a star of magnitude 0 or +1. In October Saturn is low in the east as the sky darkens and is visible all night, moving to a position high in the south by the middle of the night, and to a position low in the west by dawn. As the months progress, an observer who always looks for Saturn one hour after sunset will see it move from a position low in the east in October, toward a position low in the west in March, near Venus. This apparent westward motion of Saturn (and all the outer planets) as the months pass is caused by the earth's revolution about the sun. The entire evening star field shifts westward during the year for the same reason. A careful observer will note that most of the time the planets actually appear to move eastward relative to the star field.

During April and most of May 1969 Saturn will be lost in the glare of the sun. In late May, Saturn becomes visible in the east an hour before sunrise, to the lower left of Venus. Saturn rises about four minutes earlier each day. By mid-June it rises 2 1/2 hours before the sun. On the morning of June 11 it is very close to Venus; it will be interesting to observe and photograph the pair for several mornings around this date.

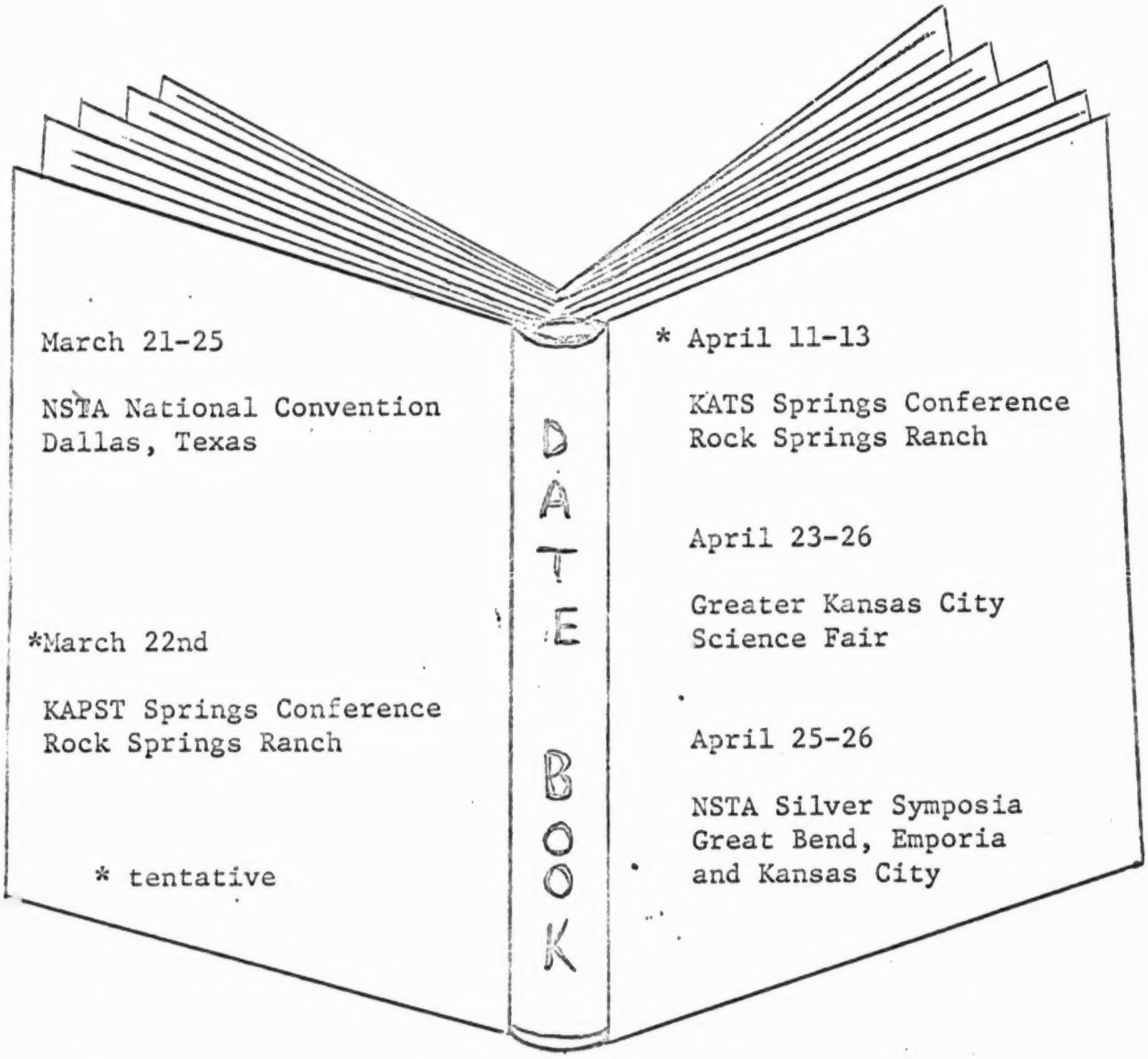
Suggested Reading Material



Testing and Evaluations for Sciences by William D. Hedges

Nature of Science and Science Teaching by James T. Robinson

Preparing Instructional Objectives by Robert R. Mager - 1962 - Fearson Publishers, Inc. 2165 Park Boulevard, Palo Alto, Calif.



March 21-25

NSTA National Convention
Dallas, Texas

*March 22nd

KAPST Springs Conference
Rock Springs Ranch

* tentative

* April 11-13

KATS Springs Conference
Rock Springs Ranch

April 23-26

Greater Kansas City
Science Fair

April 25-26

NSTA Silver Symposia
Great Bend, Emporia
and Kansas City

KATS KAMP, April 11, 12, and 13

Again this year, KATS will howl at Rock Springs 4-H Camp. Enrollment fee for non-members will be one dollar more than for members. We expect a large number of participants this year. The program will consist of general sessions with inspirational speakers, field trips covering ecology and geology, workshops in new curricula, film presentations, and 15 minute presentations of teacher devised materials and methods in science and math. We need volunteers to make these presentations. (KEMS Teachers should be great for this. Contact Herb Simmons, 1419 Highland - next door to Science Center - Emporia, Kansas 66801.) Registration will begin Friday evening and Kamp will break-up Sunday afternoon. Protestant services will be held at the Kamp and Catholic services may be attended in Junction City.

KEMS participants who are also KATS officers or directors are Twyla Sherman, Vera Molloy and Margaret Waugh.

Karen Lowery says:

Please express my thanks to the KEMS Kids for the lovely orchid. It was a tremendous surprise from some really trememdous educators. The orchid lasted all our trip and I received lots of compliments. The ACT Conference was outstanding in that it was a "learn by doing" affair KEMS STYLE almost all were small groups of 10 or less people.

Something to Smile About

We received word that Arvilla Riegal's husband is up and back to work again. We are so happy for you Arvilla. Now get to work !!!!

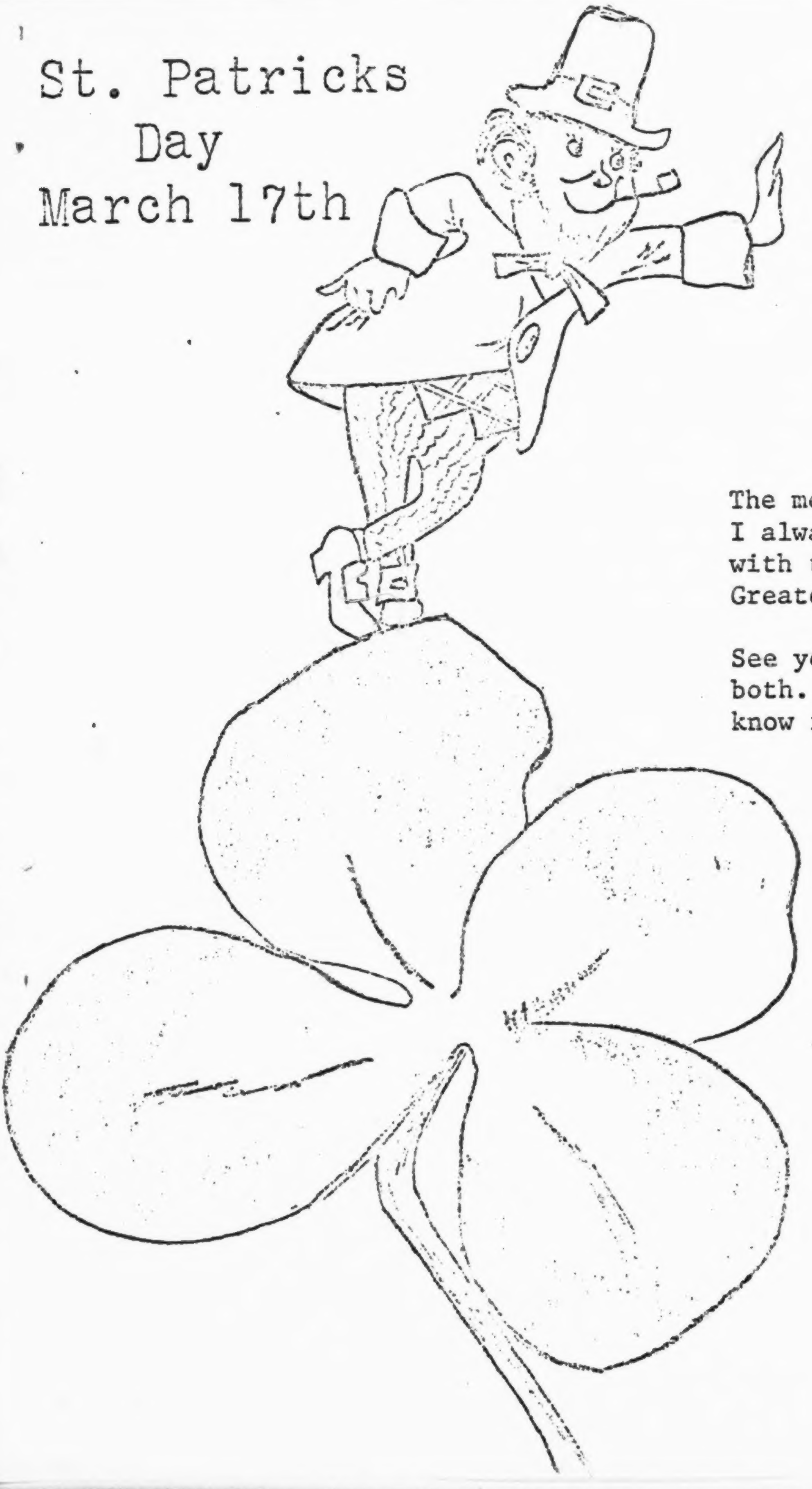
Ramona J. Anshutz
K.S.T.C.
Emporia, Kansas 66801

KANSAS ELEMENTARY MATH SCIENCE

#7
March, 1969

~~Science Center~~
1427 Highland

St. Patricks
Day
March 17th



"Who said Spring was
just around the
corner?"

The meeting in Wichita was just great! I always get such a thrill when I work with the KEMS teachers. They are the Greatest!

See you all in Pittsburg or Dallas or both. Please keep in touch and let me know if I can help you with anything.

Ramona

The Impossible Voyage
by Bobby

Crash!

The time is the year 1980, the place - a private saucer. A defecting Russian scientist sits slumped in one of the saucer's four bucket seats. Across from him sits the man responsible for getting Dr. Ivan Sputnik out of Russia, security agent Lee.

Dr. Sputnik was no minor scientist for only he knows the secret of atomic space travel! His agent is nervous for a good cause (Russia has vowed to get Sputnik.)

Waiting at the saucerport was an armed escort to convey Sputnik to NASA's secret headquarters!

Meanwhile, along the route, several Russian spies wait at the remote control console for a collision car! Slowly Sputnik's escort arrives...all at once there is a huge CRASH! Sputnik is injured!

Operation "Stomach"

"Sputnik's injury is in the vicinity of the pancreas. Since the general location of his injury isn't known we can't operate from the outside," said Dr. Jones. "Why not miniaturize a ship and medical crew to reach it through the degestive system?" replied General Matthews. "I'll send them to CMDF for miniaturization." A few hours later in CMDF's underground headquarters an operation is under way with the ship and crew!

The crew consists of a medical team of two, Dr. Jones and Dr. Sanderson, also Captain Reid and security agent Lee. The ship looked much like a chocolate chip except for air vents and windows. Once miniaturized they were the size of a sugar crystal.

Down the Hatch

"Fasten your harnesses everyone," commanded Captain Reid. "We're entering the mouth." Lee questioned Dr. Jones about what happened in the mouth. Soon Dr. Jones was telling everyone. "In the mouth the food is chewed, softened considerable with saliva..." At this point he was interrupted by an exclamation from the captain, "What's this junk covering my ship?" Dr. Sanderson answered, "It's mucin, which acts as a lubricant to help slide us down the throat or esophagus." "Look behind us and you'll see the muscles contracting, shoving this ball of food to the stomach." Everyone looked into the darkness behind expecting to see some strange monster swallow them again but instead they saw a wall with a hole that kept even time with them, pushing them to the stomach.

Stomach

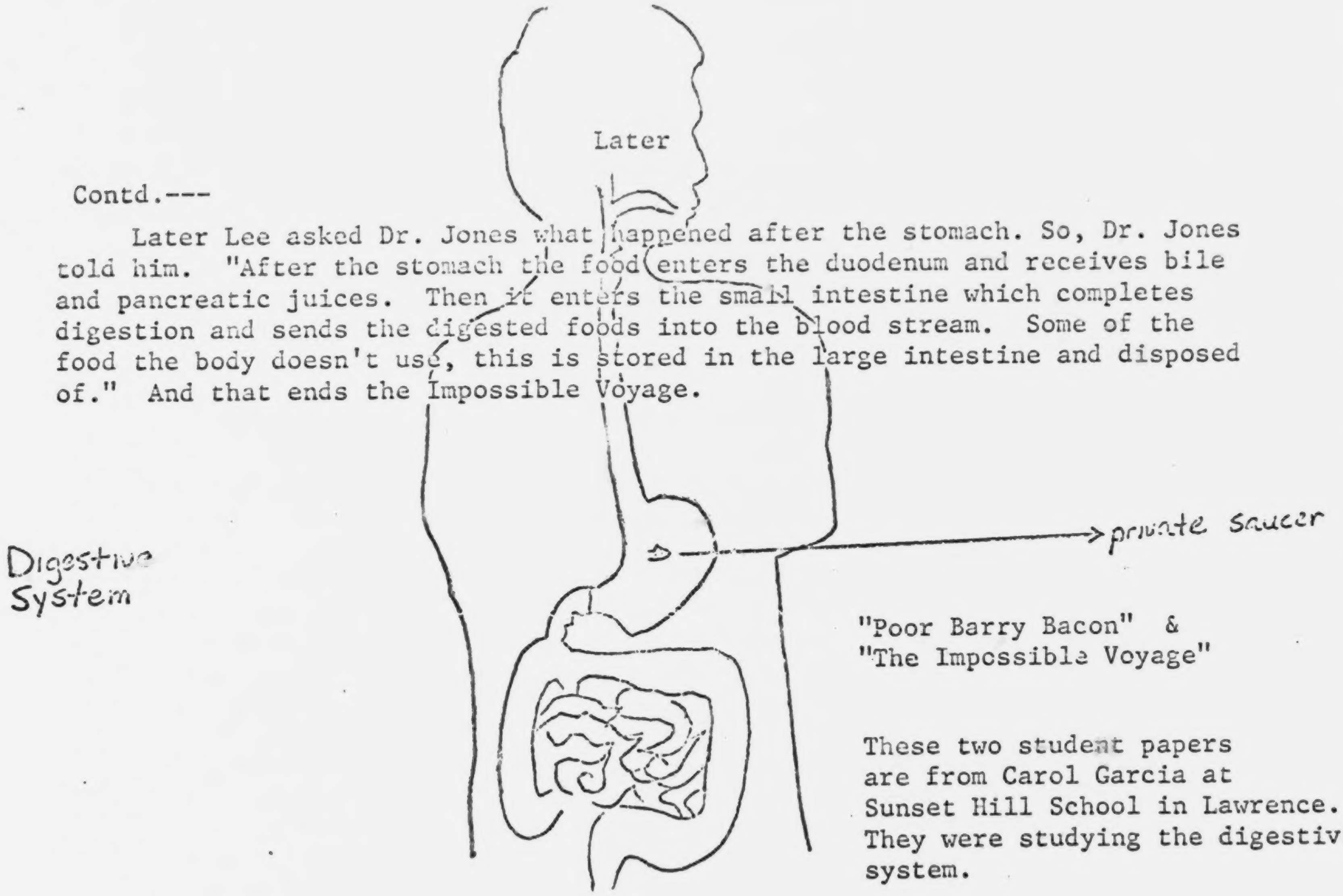
"You'd better fasten your harnesses," suggested Dr. Jones. "In the stomach we'll be churned well and mixed with more digestive juices." So it was, soon after the stomach was full it began to churn the food for about 3 hours. Soon they were on their way again, surrounded by a creamy soup. "Soon we'll be at the place to operate," mentioned Dr. Sanderson. In a little while they came to the spot where they injected the medicine into the pancreatic duct and left for the removal point.

Contd.----

Later

Contd.---

Later Lee asked Dr. Jones what happened after the stomach. So, Dr. Jones told him. "After the stomach the food enters the duodenum and receives bile and pancreatic juices. Then it enters the small intestine which completes digestion and sends the digested foods into the blood stream. Some of the food the body doesn't use, this is stored in the large intestine and disposed of." And that ends the Impossible Voyage.

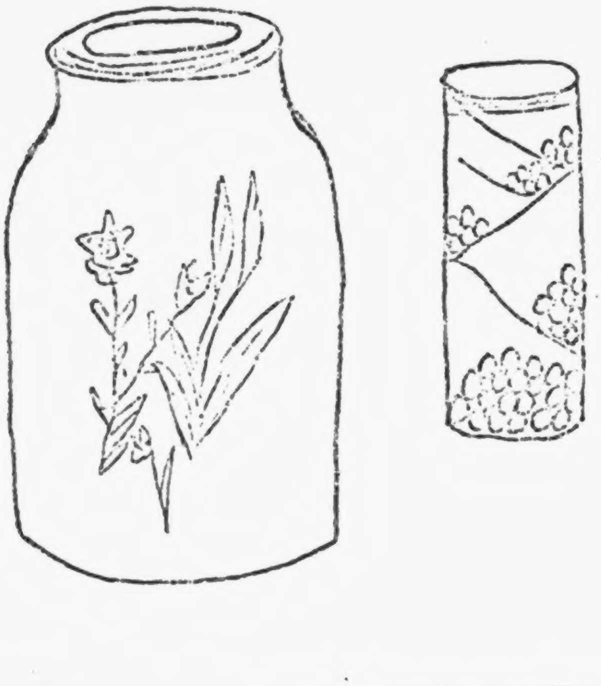


"Poor Barry Bacon" &
"The Impossible Voyage"

These two student papers are from Carol Garcia at Sunset Hill School in Lawrence. They were studying the digestive system.

Fun With Bottles and Jars

Soak the labels from jars or bottles of interesting shapes or colors. Use Saran Wrap, Handiwrap, or some other such plastic wrap torn off in strips. Crush the strips and push into the bottle. Arrange in the jar or bottle along with plastic flowers, marbles, or whatever you think might be decorative. Fill the bottle with water. If the bottle is clear, food coloring can be used to obtain the color and shade you desire. The children like to watch the color creep to the bottom of the bottle so I don't color the water before putting it in the bottle. Some of the children have tried various kinds and colors of paper or foil as well as wrapping buttons in foil. Place in a window in the light and watch the light shimmer through your creation. If kept over a period of time, the water will need to be changed.

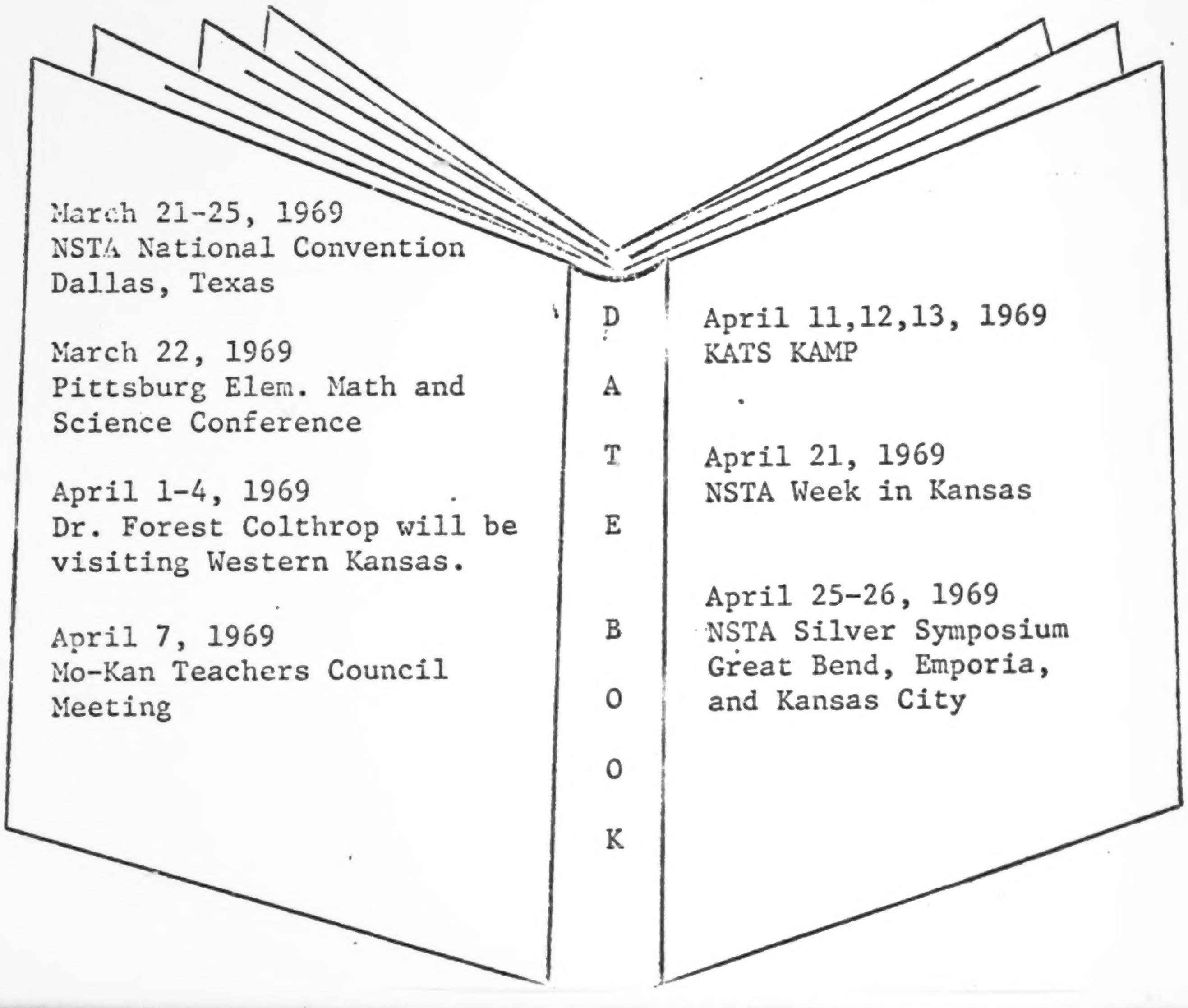


This idea came to us from the classroom of Majorie Anne Frankenbery at Lincoln Elementary in Fredonia.

Poor Barry Bacon

by Dennis Haack

Hello, I am Barry Bacon. I am sitting in Robert's plate after having a sizzling hot bath in oil in a frypan. Now the Harriss's are saying their dinner prayer. I may as well say my own. First Rob cut me in 10 pieces. Now he has me on his fork and here comes Mickey Mouth and his family. Hello, Tommy Teeth, are you very sharp today? Ugh! Yes he sure is. I'm being grinded and here comes Sally Saliva. She will help me become a liquid. Now Robert is ready to swallow me. Here comes Merry Mucin. He will keep me together and also act as a lubricant so that my trip down the esophagus won't be so painful for Robert. Whee, down the big slide. Every inch of the way I strike nerve impulses and the muscles of the esophagus contract above me so I am smaller when I meet Sammy Stomach. Here he comes now. Here I will stay for 4 hours getting chemically changed. Sammy is sort of a reservoir for food. Now I see from the sides of Sammy coming some pepsin and other chemicals that want to break my starch up. They want to break me up because here comes Carol Contract. She breaks us up by contracting and letting go again and again. I sure have waited a long time in the stomach. Finally I get to meet Dick Duodenum. All the way I have gotten juices poured over me so now I am pretty well a liquid. Dick is a passage from the stomach to the intestine. Patty Pancreas will break me down now with her pancreatic juice. Larry Liver has supplied some bile for making pancreatic juice. Here is Injun' Intestine. He is highly associated with the manager of Blue and Red Bloodstream, Inc., who is Big Bloodstream. Injun has a big family of villi who carry food into the bloodstream. Well, here I go. I have been in here about 2 hours and all that's left of me is waste. The villi really carry you into the bloodstream. The good stuff of me soaked right through the villi. In the large intestine some of me will be carried by the water to the rectum. Some of me will exit at the end of the large intestine. I have spent about 6 hours in the large intestine. It takes a long time for food to fully digest and exit the body.



DATE BOOK

March 21-25, 1969
NSTA National Convention
Dallas, Texas

March 22, 1969
Pittsburg Elem. Math and
Science Conference

April 1-4, 1969
Dr. Forest Colthrop will be
visiting Western Kansas.

April 7, 1969
Mo-Kan Teachers Council
Meeting

April 11,12,13, 1969
KATS KAMP

April 21, 1969
NSTA Week in Kansas

April 25-26, 1969
NSTA Silver Symposium
Great Bend, Emporia,
and Kansas City

DIRECTOR'S DELIGHT

I wish to call special attention to the M.A.A.-K.A.T.M. program at Wichita State University on Saturday, March 29, 1969. This program has special sessions for elementary school teachers which should be very helpful. As KEMS Project Director it is indeed a pleasure to add my support to this fine program by designating it to one of the recognized KEMS meetings. All project participants are urged to attend.

Lucile Asher will be making a presentation at that meeting which should be very interesting. There are plans now for all KEMS project staff to be in attendance. I hope to see you there too. My reservations are in, are yours?

A PROJECT CONSPIRACY?

It was called to the attention of Mrs. Anshutz that over the past (3-4) years in each elementary science project with which she has been associated at least one teacher has been selected to receive local, state or national recognition.

The Flint Hills Science project had Bernice Johnson, Burlington last year and Nellie Smith, Madison this year. From the KEMS project this year so far Karen Lowery has been honored. Are there others? Please convey any such news to the project office. G.H.C.

CRUMB "SHELLS OUT"!

Dr. Paul Dehart Hurd recently informed the KEMS project director that he had been selected as recipient of a Shell Merit Fellowship to attend Stanford University June 23 to July 19, 1969. The purpose of the program is to explore ways in which college science faculty members may assist and provide leadership for the improvement of the science curriculum of elementary and junior high schools. Special attention is given to working on in-service and pre-service college courses for elementary school teachers.

KANSAS ELEMENTARY MATH SCIENCE

8
April, 1969

Science Center
1427 Highland

$ DUE YOU ?

In order to calculate the amount of stipend you will receive for the one-week session June 2 - 6, 1969, we need the latest information on the number of dependents you wish to claim. Send a statement of the number of dependents you wish to claim, including yourself, to Ramona. We will order the checks about May 1, so act now!

NO MORE EMPORIA KEMS MEETINGS !

With the Silver Anniversary Symposium, the formal in-service meetings for the 1968-1969 school year will end. Ramona will be visiting some schools and the Wichita meetings will continue, but we will not meet again in Emporia until June 2, 1969.

NSTA SILVER ANNIVERSARY SYMPOSIUM

Hey, something great is going on April 25th and 26th! The National Science Teachers Association is celebrating its Silver Anniversary. You are all invited to attend the Emporia session. Several of the KEMS teachers are involved. The program centers on TV tapes of classroom teaching and pupil activities. You should attend if possible - see the program included.

Material!!

S E E Catalogues
Have been ordered, but have not yet arrived. Just as soon as they get here I will distribute them to each of you.

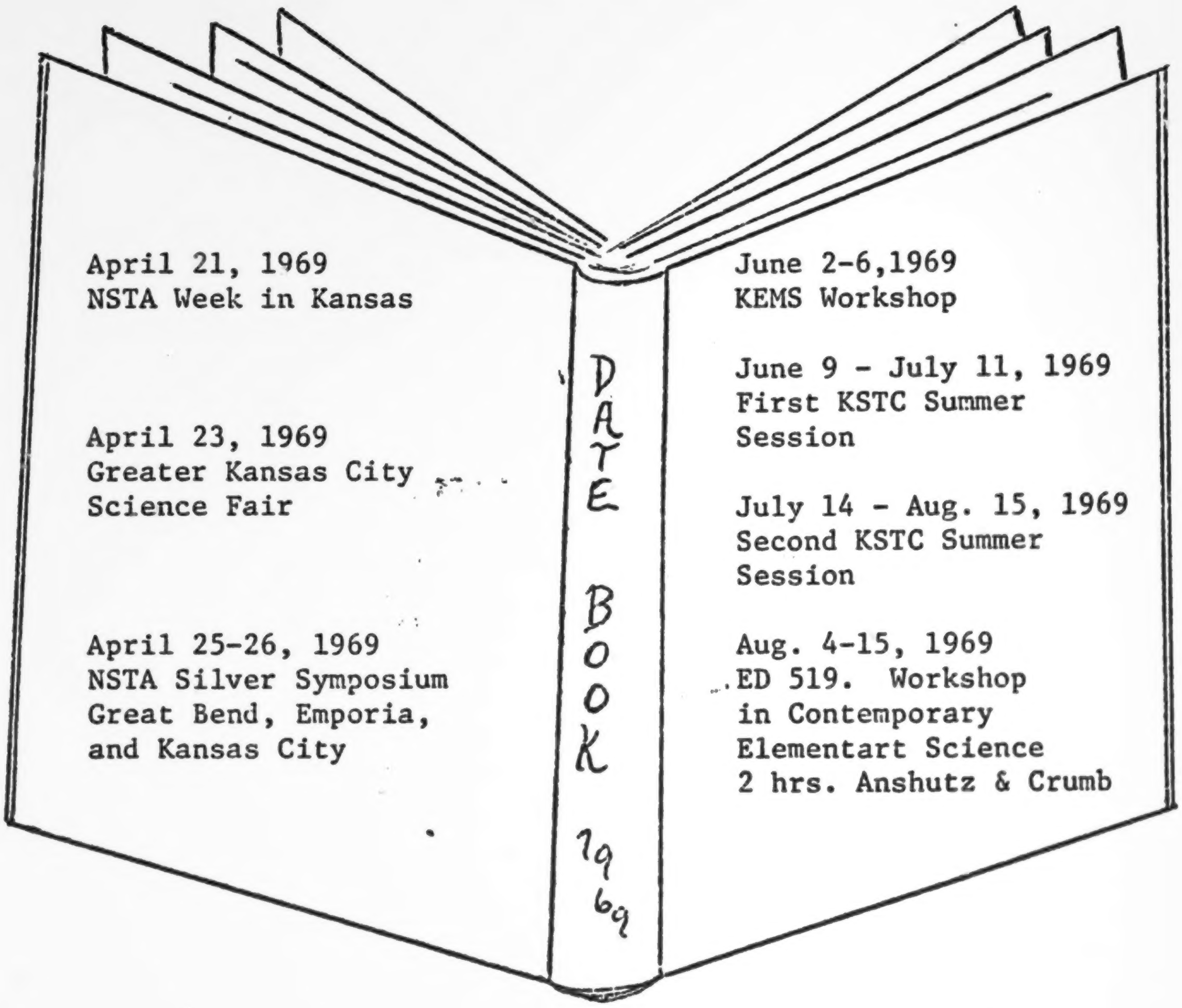
Life Cycles
The new SCIS Life Cycles is out. I have ordered one for each of us KEMS People. These will also be distributed when they arrive.

Be Sure And Read!
Forrest Colthrop has a great article in the latest Math & Children.

Dr. Coltharp will be in Emporia for the June 2 - 6 workshop. Perhaps this article will provide you some important insight for the summer sessions he will be conducting.

NOTE !!

The dormitory rooms will be available KEMS Workshop participants during the week of June 2 - 6. The cost on a weekly basis (without deposit) is around $10. Contact the Housing Office, Kansas State Teachers College for your own arrangements.



April 21, 1969
NSTA Week in Kansas

April 23, 1969
Greater Kansas City
Science Fair

April 25-26, 1969
NSTA Silver Symposium
Great Bend, Emporia,
and Kansas City

June 2-6,1969
KEMS Workshop

June 9 - July 11, 1969
First KSTC Summer
Session

July 14 - Aug. 15, 1969
Second KSTC Summer
Session

Aug. 4-15, 1969
ED 519. Workshop
in Contemporary
Elementart Science
2 hrs. Anshutz & Crumb

MARCH 1969

Information for helping teachers
and students observe the sky

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
Venus visible in binoculars all month as thinning crescent - - - - - - - - Compiled at Abrams Planetarium Michigan State University - - - - Times are E. S. T. - - - - Risings, settings from Lansing		Public Program: JOURNEY THROUGH THE UNIVERSE Fri. 8 p. m. Sat. 2:30 & 8 p. m. Sun. 2:30 & 4 p. m. through April 27	Venus dominates western sky in early evening all month, with fainter Saturn to lower left. Jupiter rises in east in early evening.	Mars is directly south about $1\frac{1}{2}$ hours before sunrise all month. It will be interesting to record its apparent motion in relation to the constellation Scorpius.		1 Sunrise 7:13 a. m. Sunset 6:29 p. m. Venus phases interesting with binoculars and telescopes all month.
2 Regulus 2^{o} from moon. Note that the moon rises much later each night after full. (Around the September full moon it rises only about 20 min. later each night.	3 Mars passes within 1/12 degree of 3rd magnitude Beta in Scorpius. - - - - - - - - Full Moon (visible all night). Moonrise 6:05 p. m. Sunset 6:30 p. m.	4 Moonrise 7:13p. m. Jupiter to lower left of moon in evening.	5 Jupiter near moon, morning and evening. Moonrise 8:23 p. m.	6 Moonrise 9:35 p. m. Moon very close to Spica in late evening.	7 Watch Mars approach Antares in morning sky next 10 days. Moonrise 10:49 p. m.	8 Moon rises after midnight (12:06 a. m. Sunday)
9 Moonrise 12:06 a. m. - - - - - - - - - - Sirius, the brightest star, is directly south about 2 hours after sunset this time of year.	10 Mars 6^{o} above moon, and Antares to left (east) of moon this morning.	11 Last Quarter (Moon half full and precedes sun by $\frac{1}{4}$ day. Moon in south at sunrise and sets at midday.)	12 Moon continues to be visible every morning around sunrise through March 15.	Locations of planets, mid-month: One hour after sunset: Venus: 20^{o} up in W, brilliant (mag. -4.2) Saturn: 15^{o} up in W, bright (mag. +0.8) Jupiter: 5^{o} up in E, very bright (mag. -2.0) One hour before sunrise: Jupiter: 20^{o} up in WSW Mars: 25^{o} up in S, bright (mag. +0.3)		15 Jupiter, moving retrograde, passes 1^{o}N of Uranus. Use binoculars to see 6th magnitude Uranus.
16 Venus, in the constellation Pisces in the western evening sky, begins to retrograde against the star background.	17 Mars 6^{o} above Antares "the Rival of Mars," in the morning. - - - - - - - - - - New Moon -- not visible - rises and sets with sun. Dark side toward Earth.	18 First chance to see waxing crescent moon in W after sunset. Sunset 6:49 p. m. Moonset 7:34 p. m.	19 Venus to upper right of crescent moon in evening, Saturn to upper left of moon. - - - - - - - - Look for earthshine on moon all week.	20 Spring begins. Sun rises exactly east and sets exactly west. Sunrise 6:41 a. m. Sunset 6:51 p. m. Moonset 9:52 p. m.	21 Jupiter at opposition with sun (rises in east at sunset and is visible all night) Algol minimum - - 8:50 p. m.	22 7:45 - 10:45 p. m.: Moon occults several stars in Pleiades Cluster. Use binoculars or telescope.
23 Aldebaran 11^{o}S of moon in the evening. 30 Regulus west of moon.	24 Record the last dates you will see Venus or Saturn. 31	25 First Quarter (Moon half full and follows sun by $\frac{1}{4}$ day. Moon high in south at sunset.)	26 Castor and Pollux east of moon.	27 Castor and Pollux west of moon.	28	29 Regulus east of moon.

THE SKY CALENDAR

APRIL 1969

Information for helping teachers
and students observe the sky

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
Jupiter dominates southeastern sky during the evening and is visible most of the night. Mars rises in SE about midnight, and is visible rest of night. Saturn faintly visible to left of Venus at beginning of month.	Venus visible immediately after sunset low in western sky to careful observers during first part of month. On what date will you last see it?	1 Sunrise 6:20 a. m. Sunset 7:05 a. m. Jupiter above moon in evening. Arcturus rises at sunset this time of year. Follow the arc of the Big Dipper handle to Arcturus.	2 Full Moon rises 7:17 p.m. and is visible all night, approaching Spica in Virgo. " Follow the arc to Arcturus and drive a spike to Spica."	3 Moon after full rises much later each night at this time of year. Moonrise 8:32 p. m.	4 Moon will be visible each morning around sunrise until April 15. Moonrise 9:51 p. m.	5 Begin looking for Venus just before sunrise very low and to the north of the sunrise point. Binoculars will help. Moonrise 11:11 p. m.
EASTER 6 Antares 5° to east (left) of moon in morning sky. Mars, even brighter, to upper left of Antares.	7 Mars to upper right of moon in southern sky 1½ hours before sunrise. Antares to lower right of Mars.	8 Venus at inferior conjunction (passes nearly between earth and sun). Since Venus will pass 7° north of the sun, it may be possible to view it just before sunrise and just after sunset.	9 Last Quarter (moon half full and precedes sun by ¼ day. Moon low in south at sunrise.)	After Vega rises in the NE and before Rigel sets in the WSW, there are 11 first magnitude stars visible. How many can you identify?		12 Jupiter, moving retrograde, will pass 1° north of fourth magnitude Beta in Virgo in 26 days. Sixth magnitude Uranus is now 2½° east of Jupiter. Use binoculars
Locations of planets, mid-month: One hour after sunset: Jupiter: 35° up in SE, very bright (mag. -2.0) One hour before sunrise: Jupiter: setting in west Mars: 20° up in SSW bright (mag. -0.6)		15 Venus and waning crescent moon rise about ½ hour before sun. Phase of Venus visible with binoculars.	16 New Moon (not visible -- rises and sets with sun, and dark side is toward earth.)	17 First chance to see waxing crescent moon in WNW after sunset. Sunset 7:23 p. m. Moonset 8:44 p. m.	18 Look for earthshine on dark side of moon next few nights. Moonset 9:51 p. m.	19 Aldebaran 12° to left of moon tonight. Watch for Mercury about ½ hour after sunset very low in WNW (below and to right of Aldebaran). Visible next 3 weeks.
20 Moon visible at sunset each day through May 1.	21 April 21-23: Lyrid meteor shower. Best from midnight until about 1½ hours before sunrise.	22 Castor and Pollux (the Gemini Twins) are above the moon in the evening.	Venus now rises more than one hour before sunrise. It will be easily visible in the eastern morning sky until early December.	First Quarter. (Moon half full and follows sun by ¼ day. Moon high in southern sky at sunset.)	A line from Betelgeuse to Aldebaran points to Mercury, easily visible low in WNW 45 minutes after sunset.	Regulus, the brightest star in Leo the Lion, is close to the moon tonight.
27 Mars, the bright object in the southern morning sky, begins to move retrograde against the stars (back toward Antares).	28 Jupiter only 1° N of the moon in early evening.	29 Pleiades close to Mercury. Use binoculars. Look low WNW 1 hour after sunset.	30 Moon close to Spica in early evening.	Compiled at Abrams Planetarium Michigan State University by Robert C. Victor - - - - - - - - - - - Times are E.S.T. - - - - - - - - - - - Risings, settings from Lansing		Public Program: JOURNEY THROUGH THE UNIVERSE Fri. 8 p.m. Sat. 2:30 & 8 p.m. Sun. 2:30 & 4:00 p.m. through April 27. Countdown: Mars starts May 2

THE PLANETS IN 1969

Excerpts from teacher information available from the Abrams Planetarium at Michigan State University, East Lansing, Michigan 48823 for the first few months of the year.

I. Evening Stars

Mercury—January 1 until mid-January; late April and early May
Venus —January 1 until early April
Mars —Mid-May through year's end
Jupiter—Early March until early September
Saturn —January 1 until late March; early October through year's end

II. Morning Stars

Mercury—Mid-October
Venus —Mid-April until mid-December
Mars —January 1 until mid-June
Jupiter—January 1 until mid-April; late October through year's end
Saturn —Late May until early November

III. Planet Events Month by Month

March 3—Mars passes only 1/30 degree N. of Beta in Scorpius (morning)
3—Venus at greatest brilliancy (evening)
15—Jupiter (retrograding) passes 0.9° N. of Uranus. (Use binoculars to see Uranus.) (Visible all night.)
17—Mars passes 6° N. of Antares (morning)
21—Jupiter at opposition, 180° from sun. In east in evening, and visible all night.

April 2—Venus and Saturn set together (evening). Because of sky brightness, use binoculars to see Saturn.
8—Venus at inferior conjunction (not easily seen, nearly between earth and sun)
Mercury at superior conjunction (not visible, nearly behind sun)
18—Saturn in conjunction with sun (not visible, nearly behind sun)
25—A line from Betelgeuse through Aldebaran points to Mercury (evening)
26—Mars stationary, begins to retrograde (morning)
29—Mercury passes within 2° of Pleiades (evening). Use binoculars to see Pleiades.

May 5—Mercury at greatest elongation, 21° E. of sun (evening)
14—Venus at greatest brilliancy (morning)
23—Jupiter stationary, resumes direct motion (evening)
29—Mercury at inferior conjunction (not visible, nearly between earth and sun)
31—Mars at opposition, 180° from sun. In southeast in evening and visible all night.

June 3—Mars (retrograding) passes 2°N of Antares (visible all night)
11—Venus passes 0.3° S. of Saturn (morning)
17—Venus at greatest elongation, 46°W. of sun (morning)

KANSAS ELEMENTARY MATH SCIENCE

Science Center
1427 Highland

No. 9
May-69

Guess What!
The End is Near!

Little by little an hour goes by,
 Little by little a day;
  Little by little you reach your goal
   or let it slip away.

Can you believe a year has past?
Time to gather again and find out
What you have been doing all year
Re-new old acquitances and exchange
ideas.
The K E M S Staff are looking forward
to seeing you again in June.

FREE QUOTES FROM THE CONFERENCES- Taken from the Connecticuticut Science Teachers Association Newsletter.

-We don't have enough time nor money to work out our teaching in isolated groups.

-There must be involvement before one becomes a learner. Engagement modifies behaviour.

-Playing with clay may make no pots, but it makes potters.

-The higher the rewards, the less the security...we've removed from the school disorder, risk, chance and conflict.

-Good teachers can tell the difference between feed-back and echo.

-Among the moral imperatives there is none higher than to act on the best knowledge available to us. Not to take account of science where it is relevant is immoral.

-My own suspicion as to the cause of the current disenchantment with science is not so much that science is not well taught, as that the wrong things were taught too efficiently.

-The UN Geneva Conference listed highest priority world problems in this order: increasing the sources of edible protein; identification of world's natural resources; and, science education...what is needed is an education which turns the pupil's curiosity into a lifelong drive...to communicate the spirit of science and to develop a sense of social responsibility in the application of science, should be among the principal goals of education.

-Students are better prepared today on entering college than before-probably they write better as they enter than when they leave.

-The world's work is done by a small proportion of people. Science teachers are among the most influential people.

-Engineers have been accused of lack of humanism. But they develop machines to release people from drudgery. Maybe they are the deeper humanists in the end.

BOY IS MY FACE RED

I said Dr. Colthrop had an article in MATH & CHILDREN and this was wrong. It was in the MATH BULLETIN.

LOST! LOST!

Mr. Richard Schmidt has misplaced a #4 bird case. If anyone has it, please contact him. If you have a bird case and you are coming in before June 2, please bring it back then. Thank you!

DON'T FORGET

Anyone who has any equipment checked out be sure and bring it all in when you come for KEMS Week.

Campus Housing

For those requesting campus housing for the week of June 2-6 we have had to alter plans due to maintenance of facilities on campus. However, satisfactory arrangements have been made, I believe, to house participants in the Teachers College apartments.

You may check in after 8:00 a.m. June 2, 1969 by contacting Bill Davidson in the housing office (east entrance Womens Residence Hall). It will be necessary for you to check out of your residence by 9:00 a.m. on June 6, 1969.

Participants will be asked to share an apartment with other participants of the same sex but each will have their own private sleeping area.

If you had requested campus housing and do not wish to meet the requirements stated above please call me collect.

Those not yet requesting college housing will be required to make their own arrangements.

G. Crumb

$ Dollars Due you

Upon arrival at our first session we plan to give you your travel check. Your stipend check should arrive Thursday for distribution on Friday, June 6.

Tentative Schedule - Two Math sessions will be held daily also!

	Monday	Tuesday	Wednesday	Thursday	Friday
8:30	Organizational Meeting Interaction Section	Out-of-doors	Photography	Relativity Session	TV Tape Evaluation
10:00	Coffee	Coffee	Coffee	Coffee	Coffee
10:30	Out-of-doors	Photography Workshop	Interaction Session	Relativity Session	TV Tape Evaluation
12:00	Lunch	Lunch	Lunch	Lunch	Lunch
1:00	Ordering Equipment	Ordering Equipment	Administration of Workshops	Administration of Workshops	Administration of Workshops
2:30		Special Session	Special Session	Special Session	Special Session

Plans Finalized - Almost!

In order to get the most of our week of June 2-6 together the following arrangements have been made.

Our first meeting will be at 8:30 a.m. Monday, June 2, 1969 in room 128 of the Science Hall. This is on the main floor south end. Enter by ramp from the east or west-south entrance.

- Besides attending the regular daily meetings with Dr. Coltharp the following activities are planned for your selection. We expect to have you participate in three (3) of the following: (1) Where, when, who and how do I get materials and equipment? (2) Photography workshop - take group pictures, develop the film and make positive prints. (My second grader does it!) (3) Exercises using the out-of-doors. (4) Activities associated with Interaction and Relativity.

- Twyla Sherman will have charge of a picnic planned for Wednesday afternoon-evening.

- Planetarium presentation Monday night, followed by study of "stars" through telescopes on first clear night.

- We are planning some special sessions to aid you in working with other teachers and administrators. These should prove very helpful.

WARNING - In order that you can be prepared with materials, etc., we are going to ask you to put down on paper (for possible publication) specific details of: "How I integrated Math and Science" or "An innovative way of teaching" or "Some different methods of presenting the same materials" or "Unusual places where I get stuff for classroom use" or anything else you have done that is exciting that you would like to share.

Our plan is to provide each participant with a copy, bound in some way. We will edit, duplicate and bind the materials and send them to you. We thought by letting you know now you could bring any student materials that you wished to incorporate in the report. Remember our KEMS book is not dullsvill! Although we want to include a group picture to if possible.

Science Center
K. S. T. C.
Emporia, Kansas